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General Articles

THE AGGLUTINATION REACTION*

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It is an old observation that when an animal suffers from a bacterial disease, there subsequently appear in the blood stream substances which react in some manner with the causal bacteria and frequently with their products. Such substances are called antibodies and that which induces the formation of antibodies is known as an antigen. Antibodies may clump or agglutinate bacteria, precipitate with bacterial products, lyse or dissolve bacteria, assist in their phagocytosis, and they are named according to their particular function. This does not mean that they are separate substances, the type of reaction between antigen and antibody being determined by the co-operating substances and the conditions under which they meet.

It is proposed to limit this paper to a consideration of the agglutination reaction and in this test the antibody is known as agglutinin and the corresponding antigen may be called by the cumbersome name of agglutinogen. It is, however, preferable to use the term antigen, and although it may not always be correct to do so it is frequently the custom to apply this term to those substances which react with antibodies *in vitro* as well as those substances which induce the formation of antibodies. This is allowable in the agglutination reaction where one is dealing with whole bacteria, for those which induce formation of antibodies also react with them. It is not strictly allowed when dealing with other reactions in which bacterial products alone may be concerned in the test tube reactions.

Widal first applied the agglutination reaction to the diagnosis of typhoid fever and subsequent workers adopted it for the diagnosis of other diseases in man and animals. It was later shown that the reaction could also be used for the differentiation of closely related bacterial species since animals immunised against a particular bacterial species also developed specific agglutinins in their blood serum. Agglutination may be observed microscopically, but this method has largely been superseded by the macroscopic method whereby the reaction is observed in small test tubes. It will be convenient to consider here the nature of agglutination, recognising that it is primarily an antigen-antibody reaction.

THE NATURE OF THE AGGLUTINATION REACTION

Before any reaction of such a nature can occur, the antigen and antibody must come into contact with each other and the actual combination consists of an absorption phenomenon, and the first phase in an agglutination reaction consists of this union. In other words, some constituent of the serum of an animal containing the antibody coats the surface of the bacterial cell. Figure 1 (see overleaf) gives a diagrammatic representation of the orthodox conception of what happens.

The surfaces of the bacteria become covered with the antibody which can be conceived as a precipitation of the antibody at the bacterial cell surface. The surfaces of the bacteria are thus altered and whereas they were previously attracted to the molecules of the fluid in which they are suspended the bacteria become mutually attracted one to another and in the presence of an electrolyte, such as sodium chloride, they cohere in masses and become visible as flocculi. Thus there are two stages in the agglutination reaction; the first stage consists of the sensitisation of the bacteria with its corresponding antibody. The second stage consists of the aggregation or flocculation of the sensitised bacteria; the bacterial suspension being converted from an even turbid suspension into one in which the bacteria cohere and settle in masses visible to the naked eye. The physico-chemical considerations of antigen-antibody reactions are the subject of considerable study and have been recently reviewed by Marrack (1934). He has suggested that the second stage of agglutination is really an amplification of the first and that it is as specific as the first stage. In other words, he considers that antigens become directly joined to antibodies in a kind of lattice framework, there being no real second non-specific stage. This hypothesis has received some support by recent experimental work by Topley *et al.* (1935), but it is unnecessary to consider this alternative conception in this paper. It is sufficient here to describe briefly the procedure adopted in an agglutina-

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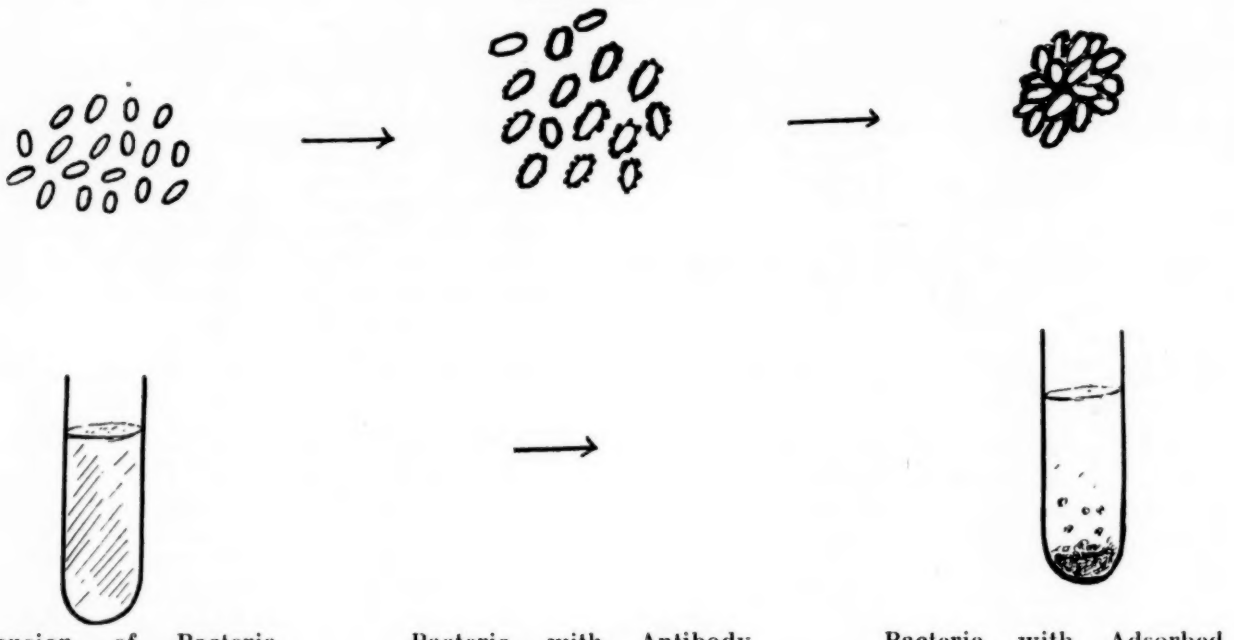
FIGURE 1.



Suspension of Bacteria evenly Distributed.

Bacteria with Antibody Adsorbed on to their Surfaces.

Bacteria with Adsorbed Antibody, Agglutinated in Presence of Electrolytes.

tion reaction. A suspension of bacteria is prepared from the growth on a suitable medium, is killed by heat, preserved and standardised. The serum is diluted in physiological saline and equal quantities of diluted serum and the suspension of bacteria are mixed. The mixtures are then incubated for a definite period of time at a definite temperature. Both temperature and time may vary with different workers, 37°C. for 18 to 20 hours being common conditions, whilst others prefer a higher temperature for a shorter period. A positive reaction consists of the visible flocculation of bacteria into masses and the highest dilution of serum at which this occurs is known as the titre of the serum.

THE USES OF THE AGGLUTINATION REACTION

In veterinary as well as in human medicine the agglutination reaction may be used to:—

(*a*) Diagnose infection in a particular patient;

(*b*) Identify a particular strain of bacteria;

(*c*) Determine the frequency of a particular infection in a herd or area and in certain instances indicate a source of infection or the paths of spread.

THE DIAGNOSIS OF INFECTION IN A PARTICULAR PATIENT: It is, of course, quite clear that the use of any antigen-antibody reaction for the diagnosis of infection is indirect evidence. It is not so definite as the isolation of the particular causal organism from the body tissues of the patient. Accepting that reservation, then it can be used as a reliable part of the evidence which a clinician collects to enable him to reach a satisfactory diagnosis. Topley (1933) discusses various factors to be considered and the possible interpretations of results by asking a series of questions. One point raised is whether the clinical entity is also a bacteriological one, that is, if several different types of bacteria may cause the same condition. For example, "Keel disease" in ducks is caused by Salmonella bacteria, frequently *S. anatum*, but *S. typhi-murium* or *S. enteritidis* also cause similar symptoms. Other points which require consideration concern the advisability of a quantitative determination of agglutinins, if there is any value in studying the fluctuations in the titre of a serum, and the necessity for information as to the stage of the disease at which agglutinins appear.

Assuming that the clinical entity is also a bacteriological one, as it appears to be in "contagious bovine abortion"—in other words that all cases of "contagious bovine abortion" are caused by *Br. abortus*—then we may proceed to consider the value of a quantitative determination of the antibody content of the serum.

It has already been indicated that the usual method of testing the agglutinin content of a serum is to mix equal quantities of diluted sera and bacterial suspension. The highest dilution of serum producing agglutination under the standard conditions, otherwise known as the titre, is frequently expressed as a dilution, *e.g.*, 1/10, 1/640, etc. There are several reasons why a quantitative test is necessary, *viz.*:—

(*a*) Different strains of the same bacterium may vary in their sensitivity and react at lower or higher titres and consequently it is advisable that some standard of uniformity be obtained by laboratories using either the same strain or one of equal sensitivity.

(*b*) Animals may possess agglutinins in their blood serum to a low titre and these so-called "normal agglutinins" may have no significance.

(*c*) It is possible in doubtful cases to retest the serum of a particular animal to enable one to determine whether fluctuations in the antibody content may occur.

The problem of different strains of similar bacteria having different degrees of sensitivity can be overcome by testing the strains under consideration with a standard serum. It also involves the use of strains which are antigenically smooth. In the case of the Brucella group, smooth cultures are undegenerated and when emulsified in normal saline will remain in suspension after heating in boiling water for two hours. Those cultures which have undergone some antigenic degeneration will precipitate under such conditions and would give exaggerated results in agglutination reactions. These difficulties may be largely eliminated in any large-scale attempt at disease elimination by using standard bacterial suspensions prepared in a central laboratory. It is, of course, well known that the use of different opacities or different strengths of bacterial suspensions will yield divergent results and this also accounts for a different criterion as to the titre above which infection may be assumed.

The second consideration concerns the distribution of agglutinins for a particular disease-producing bacterium amongst the normal population of animal species. As far as agglutinins for *Br. abortus* are concerned, Priestley (1934) has recently examined the sera of a large number of cattle amongst which were 213 steers, and 188 (88·26 per cent.) of these failed to react at a titre of 1/10. Of 100 cows examined under similar conditions only 68 failed to react at that titre. With a disease such as bovine abortion in which the disease is essentially one of females it seems permissible to argue that the 32 cows which reacted at 1/10 or over did so because of infection with *Br. abortus* either past, present or latent. The greater proportion of steers are unlikely to have been infected to any extent and this would account for the higher percentage of non-reactors. Owing to the widespread incidence of bovine abortion in this country, it is difficult to obtain large numbers of sera from cattle in which all possibilities of contact with infection can be ruled out and that is the reason why steers were included as a control series. There are, however, unpublished records of a number of herds in which all the cattle tested fail to react at that titre. It is, of course, difficult to say whether those which react at 1/10 or over are infected or have been infected with *Br. abortus*, but one can assume that a reaction of 1/10 is at least doubtful whilst reactions at higher dilutions are good evidence of past or present infection. Such an assumption does not hold good in all diseases. It is a different story when one is dealing with infections of the Salmonella group, for here we may have clinical entities which are not bacteriological ones and, furthermore, the majority of the sera of normal cattle, sheep, pigs and horses will agglutinate one or more species of that group to titres varying according to the type of antigen used from 1/10 to 1/640. (Lovell, 1932, 1934.) A similar difficulty is experienced in using the agglutination reaction as a method of diagnosing glanders. In spite of the fact that there has been no record of this disease in horses in this country during the past few years, a recent examination of sera from 314 normal horses revealed that all possessed agglutinins for *Pf. mallei*, the most frequent titres recorded being 1/320 and 1/640 (Lovell, 1935). It is outside the scope of this paper to discuss the possible interpretaton one may place on these data. The point at issue is that normal animals may agglutinate certain species of bacteria and it is of importance to know the normal limits within which such agglutination may take place. Only by a knowledge of the normal variation and the factors affecting such variation, can we hope to be in a position to assess apparent abnormality when we meet it.

Another reason for a quantitative estimation of the agglutinins is that it is frequently desirable to retest the serum of an animal against a particular bacterium. Let us suppose that the serum of an animal agglutinates a particular bacterium to a dilution of 1/10 and that the animal is definitely ill from the disease in question. Then the stimulus provided by the infecting organism will in almost all cases induce the formation of agglutinins at a rapid rate and retesting within a week or so will readily show a higher titre. Should the animal show a similar titre at the second test then it is extremely unlikely that the illness is due to the suspected organism. This also indicates the necessity for some knowledge concerning the time at which agglutinins may appear in the blood stream. It is easy to determine the period at which they appear after experimental infection and this has been determined for *Br. abortus* by M'Fadyean, Sheather and Minett (1913). Of 10 yearlings treated experimentally with living cultures of *Br. abortus* nine became infected and records of the agglutinin content of their sera are available

on the 7th, 14th, 21st, 28th, 35th and 89th days after infection. A composite chart (Fig. 2) has been prepared from the data and it is shown that there is a rapid rise of agglutinins for 21 days, after which the agglutinins fall at first fairly rapidly and then very gradually. It may be objected that this curve has been constructed from the records of animals infected by different routes and by different doses of bacteria. But it may be assumed that this also happens in nature. The titres are plotted to produce a form of curve which gives the relative variation in titre rather than the actual.

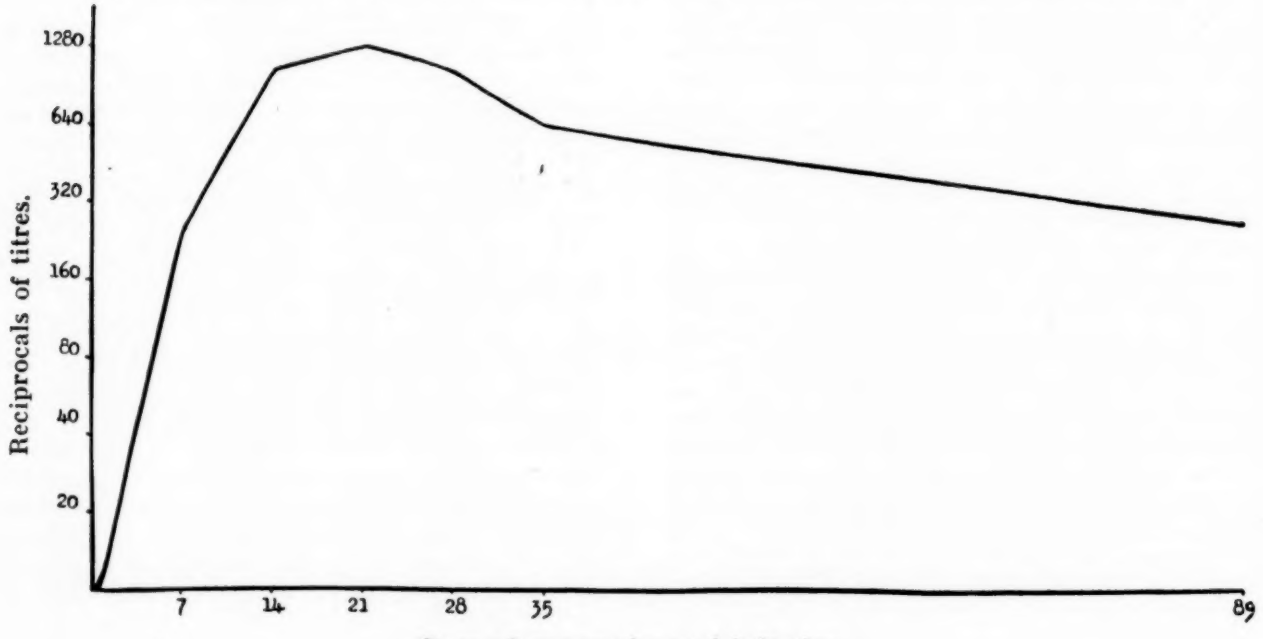
A characteristic of some samples of high-titre sera also has a bearing on this point, for agglutination may be absent in the lower dilutions with definite agglutination in the higher dilutions. This prozone phenomenon is the source of much argument and study, but it is important to realise its existence.

In assessing the information derived from an agglutination test of one sample of serum, it is, therefore, necessary to know something of the distribution of such agglutinins amongst the population of a particular animal species, and the critical titre above which one may assume infection. It is also important for the laboratory worker to be supplied with information on a number of other points in order that he may assess the value of his findings. The practitioner can assist by giving particulars of the age and sex of the animal species, in addition to any clinical history, paying particular attention to the possible time of exposure to infection and the date of onset of any symptoms. This latter information is necessary if one considers Figure 2, in which the time relations of the antibody response are plotted, and such a curve holds good for numerous conditions.

It may be taken as axiomatic that there is a rapid rise in agglutinins during the first two or three weeks of a disease and that there is after that a somewhat rapid fall until they reach a level at which they may remain for a long period with little change. One should also bear in mind that the inoculation of vaccines consisting of dead or attenuated bacteria will also stimulate the formation of agglutinins and lead to an entirely erroneous opinion should this information be withheld. The age of an animal is desirable information as the presence of the so-called normal agglutinins is influenced by age. Little and Orcutt (1922) showed that the blood of the normal newborn calf did not contain agglutinins before receiving colostrum. If the calf received colostrum from a cow with a high titre for *Br. abortus* then agglutinins will appear in a very short time. These tend to disappear within a week or so as they are " ready-made " antibodies transferred from the mother. It may be assumed that the same phenomenon occurs with normal agglutinins, for it was shown (Lovell, 1934) with a small number of pigs that at one week old agglutinins for members of the Salmonella group may be present; these disappeared within the course of a week or so and reappeared after the eleventh week. There-

Figure 2.

Composite chart showing variation in titre after experimental infection with *Br. abortus*.



after it is known that normal agglutinins increase with age, for it has been shown by many authors that normal agglutinins are much more frequent and show higher titres in older animals than in younger (Lovell, 1932, 1934; Jordan, 1933; Priestley, 1934). There also appears to be some association between sex and the presence of normal agglutinins, for in the case of normal agglutinins for the Salmonella group in swine and agglutinins for *Pf. mallei* in horses the sera from females show a greater frequency at the higher titres than males. Why this should be so is puzzling and it indicates yet another lacuna in our knowledge.

The practitioner can, therefore, help the laboratory worker and obtain a more reliable opinion as to the significance attached to the result obtained in an agglutination test if he will spare no pains in giving the greatest possible information when forwarding samples of blood for diagnosis by the agglutination test. One may quote a recent conclusion by Wilson (1934): "Provided that due precautions are taken to ascertain the normal level of agglutinins in a given host and that antigenically smooth strains are used, there is every reason to believe that the occurrence of agglutinins in a titre above the normal range of variation is due to infection—latent, active or past—with the specific organism in question, or in a few instances with an organism, usually of the same genus, showing a similar antigen." The difficulties enumerated chiefly concern those cases which fall within reasonable limits of the normal range of variation.

Before leaving this section it can be pointed out that in milch cattle whey may be used instead of blood serum but the data available are less extensive. It can, however, be confidently stated that as far as *Br. abortus* infection is concerned a positive agglutination at 1/10 may be accepted as evidence of infection, but less reliance can be placed on a negative raction. It is probable that the presence of agglutinins in whey to that titre or over indicates some abnormality of the udder and this would explain the less reliability to be placed on negative reactions.

The Identification of a Particular Strain of Bacterium by the Agglutination Reaction.—This is a purely laboratory procedure and although the technique used may be similar, the knowledge one desires to obtain is reversed. In the preceding paragraph it is necessary to know the composition of one's antigen as one is searching the blood serum of a patient for the corresponding antibody. In this case, we have an unknown bacterium and it is desirable to subject it to the action of a sample of serum which has been prepared by inoculation of a laboratory animal with a known strain of the suspected organism. Having isolated an organism and identified it as far as possible by its morphological and cultural characteristics it is sometimes necessary to confirm its identity by this means. This is an important part of a bacteriologist's work and entails considerable work as simple agglutination reactions are not always sufficient, but recourse must be made to agglutinin absorption tests, but their consideration need not detain us here.

The agglutination reaction is also used to determine the presence of *Br. abortus* in milk by inoculating samples into guinea-pigs which are killed after six weeks and, in addition to a cultural examination, their blood serum may be tested for agglutinins for *Br. abortus*. A positive reaction at 1/10 is accepted as evidence of the presence of *Br. abortus* in the inoculation milk sample and is sometimes the only evidence as cultural examination may fail. The result of such work has recently been summarised by Pullinger (1934).

The Determination of the Frequency of a Particular Infection in a Herd or Area: It is becoming increasingly important to determine the frequency of infection in herds or areas and the agglutination reaction is admirably suited to such a purpose in certain diseases. Information derived from such a survey is essential in order to eliminate infection as it gives information as to the sources of infection, the paths by which it is spread and the progress attained in any scheme of disease elimination. Here again, however, all diseases are not applicable for such a method, and similar questions should be asked as indicated in the earlier paragraph on the determination of infection in a particular patient.

It is necessary to compare the results obtained in a test herd or area with the normal population of a similar host species. It would be manifestly impossible to subject a large number of animals to extensive bacteriological examination and even so the results may yield disappointment, but a serological test is easily carried out. Assuming that the presence of antibodies over the normal variation may be evidence of infection at some time in some manner, then the incidence of antibodies against a given infectious agent may be taken as an index of the prevalence of that infection in the area in which the study is made. Furthermore, the infection may be latent and the particular animals concerned are, therefore, possible foci of infection.

A high incidence of reactors in a herd, therefore, can be argued to denote the presence of infection in that herd for a very long period and the time necessary to eliminate the disease would be correspondingly lengthy. A low incidence may be an indication of recent infection and the chances of eliminating the disease in a comparatively short period are thereby

enhanced. The rise or fall of the incidence of reactors also indicates the success or failure of the efforts made to secure elimination of the disease. In one human disease at least the periodical testing of the serum of a patient gives information regarding the progress of treatment, but so far this has not developed much in veterinary medicine. These are some of the reasons for routine examination of hens for agglutinins for *S. pullorum* in order that bacillary white diarrhœa may be eliminated. Another example concerns the periodical testing of cattle sera for the elimination of cattle which may be latently affected with *Br. abortus* and thus be a source of danger to others. In addition to affording information which may be used directly to eliminate disease it may be used to help in the diagnosis of particular cases of disease, because of the information relevant to a particular area. Should it be known that a particular infection is common in a given area, then such information is of importance to the bacteriologist faced with the diagnosis of doubtful cases of similar type. Quite recently the incidence of Brucella infections in animals other than cattle has been determined by serological methods (Doyle, 1934, Priestley, 1934) and so far it is shown that sheep and pigs do not suffer from Brucella diseases in this country whilst a proportion of horses do. On the other hand, sheep and pigs suffer from such infections on the Continent, and pigs extensively in U.S.A. Such information has a bearing on the paths of infection for Brucella infections in man.

The information which it is possible to derive from such surveys is, therefore, immense and its collection can be increased by the ready co-operation of practitioners.

Summary

The agglutination reaction and the precautions necessary in its interpretation have been described briefly. The uses of the reaction are indicated and attention is drawn to the value of including all possible details of a clinical history when one sample is examined in order to diagnose a particular infection.

The determination of the frequency of a particular infection in a herd or area by serological methods is a valuable study and it has been shown how the information can be used in procuring and maintaining disease-free herds.

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Discussion

The discussion on the foregoing paper was opened by Dr. Wm. Scott, of Bridgwater, in the following terms:—

In opening the discussion on the paper you have just heard it is my pleasant privilege to congratulate the author. A highly technical subject, he has dealt with the various points with much clarity and in a masterly style so that "he who runs may read."

Of course, coming as it does from the hand of a laboratory worker, it needs must have the laboratory hall-mark impress upon it. But this, to my mind, is a decided advantage inasmuch as it refreshes the minds of the younger general practitioners while it opens up, to the older men, that which in their student days was to many of them as a sealed book; and I need hardly remind you, too, that, in these days of scientific progress we all—young and old—must be *au fait* with every avenue of advance both as a body corporate and as individual units of that body. The worker in the laboratory views disease from his angle—that is his training; the practitioner in the "field" visualises his patients from his—that is his vocation. Keep the two apart and limitation to usefulness in the former obtains, while empiricism in the latter evolves. Combine the two and an exact scientific basis is reached wherein is found the key which opens and has opened the doors of the cause, treatment and prevention of disease. The therapeutical mainspring is ever the fruit of research and research is ever the ladder of progress.

When one harks back and looks upon a less scientific age, one must confess that the old-time practitioners did yeoman service in their day but I fear it was often in spite of, rather than because of, their ministrations that their patients recovered, and I tremble to think what their results would have been had it not been for that wonderful asset, the *vis medicatrix naturæ*. Thanks to science and the laboratory worker, nature's secrets and nature's mysteries are being solved more and more every day. But the researcher cannot work without material and data; he must needs look to the "field" to supply

these and as this is the clinician's domain, it is for him to meet the demand, as Dr. Lovell has suggested in his thesis. I must confess, however, that in these days of advanced bacteriology, pathology and biochemistry, the practitioner should apply his special knowledge on these subjects to assist him in his clinical work more often than he does. He would find such work interesting beyond measure and with that object in view I would like to see attached to every surgery in this country a small laboratory, where the practitioner could after a day of clinical study revert to the more academical side of his calling and come face to face with the microbian elements which play such havoc with his patients.

And now to the paper proper.

In describing the nature of the agglutination reactions the essayist has given us the orthodox views thereon, which, of course, being largely hypothetical, if I may say so, may only be a part of a great truth.

Is it not possible that the grouping together of bacteria in the presence of an antibody may be a family effort of self preservation on their part? We know, too, that in the presence of an electrolyte such as sodium chloride they cohere in masses. But Bordet has also shown that when a solution of common salt is added to potter's clay, the clay immediately changes and falls to the bottom. Why?

The most important section of the paper comes under the heading "The uses of the agglutination reaction," so far as the practitioner is concerned.

In discussing the diagnosis of infection by this test Dr. Lovell wisely reminds us that it is not a 100 per cent. one—that it has its limitations and unfortunately its vagaries. For instance, he cites the question of normal or physiological agglutinins as against immune agglutinating power and to make complexity worse confounded, he reminds us of the prozone phenomenon where agglutination is negative in a low dilution and positive in a high titre. This all sounds too paradoxical for words. Nevertheless, it is recognised as a fact in practice. But why is this? Can he help us with a solution?

Then again, Dr. Lovell informs us that there is a *normal* titre existing in horses which will agglutinate the glanders bacillus. Is this phase confined to horses in this country, or is it recognised, too, where glanders is rampant abroad?

The great value of the agglutination reaction, so far as the practitioner's interests go, is to be found in that bovine scourge, specific abortion. In dealing with an outbreak where a large number of animals abort and where the cardinal clinical data are in evidence and where, most important of all, the *causal* organism can be isolated, no such test is needed, unless of course for confirmation purposes. But there are occasions when none of these data are obtainable and it is here that the agglutination test comes in and can be of enormous value to the stock-owner.

Let me give you an illustration on this point. I was recently consulted by a client who had purchased a heifer and which he said had not "cleansed." His dairy was a clean one. Suspecting specific abortion, I took a sample of blood and obtained the agglutination reaction. I then tested the calf's blood but here the results were negative. Of course, the late owner denied that the cow had aborted or that the calf was a "bastard." The point of interest and upon which I should like Dr. Lovell's guidance is, how long would it be for this calf suckling an actively infected dam to show immune agglutinins in the blood? This is an interesting factor and a topical point; it is also an important forensic one.

Moreover, one may note what prompt action meant to this man. Having purchased a potential "carrier" the spread of infection might have meant to him the loss of hundreds of pounds. In carrying out agglutination tests in an infected herd one gets various readings, which of course is unfortunate but which is really to be expected. Further, the individual fluctuations on retesting may be considerable but I always make it a point, when it comes to a question of segregation and when one gets a border-line reaction, to consider it as *positive* rather than run the risk of reinfection with the herd.

It may seem strange at first sight that one should get such variations, but one must remember how complex and interwoven the whole immunising mechanism of the animal body is and how little we really know about it; hence, Dr. Lovell has wisely stressed the necessity of having carefully tabulated full histories and clinical data to fall back upon.

Then there is the type and degree of aggressiveness shown by the various organisms and even different strains of the same organism. One must look upon the agglutination reaction, I think, as one of the many keypoints in the complete rôle of immunity and we all know in practice, when using an antigenic product, the vagaries often displayed: how we get excellent responses in one series and failures in another. It appears to me that the more virulent the bacterial strain—provided it is not too virulent to produce annihilation, of course—the greater the agglutinin development. If this is so, would it not explain why Priestly obtained more reactions in cows than in steers?

One must remember, I think, that the ancestral home of the *Brucella abortus* is in the female generative system, certainly it is there that it shows its greatest destructive power and attains its highest degree of virulence.

In regard to the rise and fall of the agglutinin

content, Dr. Lovell states that there is an ascendant titre for the first two or three weeks, then a rapid fall followed by a long period of little change. Is not this in keeping with the phenomena in active immunisation?

But assuming, in the interregnum, active re-infection takes place, would not this antigenic stimulus be the means of keeping up a high agglutinin titre? It appears to me that the agglutination test will never become exact or at least specific within narrow limits.

I do not think Dr. Lovell has mentioned the *Brucella abortus* in cases of poll-evil and fistulous withers in the horse, but there is a large number of cases on record where the agglutination test has been applied with positive results. Regarding the virulence of the strains of the *Brucella abortus* can Dr. Lovell tell us why, too, the strains of porcine origin should be more virulent than the bovine? Last year I vaccinated a herd of heifers—fresh arrivals to the dairy—a practice I have carried out for over 20 years on the same farm with 100 per cent. results. In the year in question I had a record of 35 per cent. break-downs. These were Irish heifers and the first my client had ever purchased—and I may add the last—and it has been hinted to me that possibly they were infected with the pig *Br. abortus*, against which, of course, the bovine strain would not possess the same antigenic power. Moreover, is it not a fact that this porcine strain is more liable to produce undulant fever in man than in the bovine? Further, is the agglutination test capable of differentiating the *Brucella abortus* from the *Brucella melitensis*?

In man the agglutination reaction proves a valuable asset, as Dr. Lovell has mentioned in noting the progression or retrogression of a specific infection. In cattle in abortion-infected herds it is sometimes used, but I fear in veterinary practice in general its scope will ever remain limited, for the stockowner is not so much concerned with the academical course of disease as he is with its elimination, and that he estimates us by the fruits of our labours and the practical and profitable results we are able to give him.

The paper having been thrown open to general discussion, Mr. Caldwell said that if cows became infected with *Brucella abortus* it must be a long time before they actually aborted, and one would expect the agglutinins to be present in the blood serum to a high titre at that time, whereas in actual fact the reverse was often the case. He was rather interested in streptococcal infections of the cow's udder and in those cases differentiation was rather difficult. He wondered if it would be possible to make an agglutination test by means of the milk. He wished to say how much he had appreciated listening to Dr. Lovell that afternoon.

Mr. J. B. White said Dr. Lovell had told them a normal limit of the agglutination reaction with bovine abortion serum was one in ten. Did he think that was a normal protective agency? Again, for how long after the infection in a cow infected with *Br. abortus* had been eliminated did the agglutinins persist in the blood? The reason he asked this was that if one had a case on a farm they could not send the beast back among the sound ones until the agglutination test was negative, and sometimes that might keep them waiting rather a long time. He did not know whether there was any way in which they could judge, before the tests were completely negative, whether the animals were safe to go back. He was not sure that he had understood Dr. Lovell correctly, but he understood him to say one did not get outbreaks of Brucella infection in sheep and pigs. He seemed to remember having sent up a number of blood samples from sheep to the laboratory, and having them returned as contagious abortion.

The discussion was continued by the President, Mr. J. F. D. Tutt, who said he was once asked to test a cow which the Ministry had described as a doubtful case. He did so and one laboratory said it was distinctly positive. He sent a test to another department who said it was distinctly negative. Dr. Lovell had advised in his paper a re-testing in doubtful cases and the subsequent results were both positive. He also had a case in mind in which he had to remove a fœtus from a cow. Here the result of a test was positive but in a month's time the result of a further test was negative, and eventually the result was positive again. He was rather interested to hear about the porcine strain being more virulent than the bovine. He certainly thought it was so with regard to man. He thought, however, a great deal of the talk they heard about *Br. abortus* infection in the human being traceable to cattle was exaggerated. One other point with regard to infected milk—he should think that milk from a naturally infected animal was far more dangerous than that from one artificially infected. He would also like to ask Dr. Lovell if he had done anything in connection with the new test for contagious abortion, and if so, whether the results compared favourably or otherwise with the agglutination reaction.

Mr. B. Gorton, after observing that Dr. Lovell's presence that afternoon reminded him of old times, said he did not think there was much difference in the agglutination test to-day and as they knew it in 1909. He did not agree that every practitioner should be a bacteriologist: clinicians should be clinicians; doctors were certainly not all bacteriologists, but he did not think they were any the worse, either financially, socially, or professionally. He used to pride himself that he knew a good deal about anatomy, but he had not found it of any great service to himself. Sometimes it made him more sure, but generally it made him less sure about anything he did or said.

The Reply

Invited by the President to reply to the discussion, Dr. Lovell first thanked Dr. Scott for what he had said about the paper. "He has certainly asked me a good list of questions in spite of his telling me what a good paper it is, but I suppose that is only by way of rubbing it in," he added amid laughter. With regard to the prozone reaction, he was afraid one would have to dip rather deeply into physico-chemistry, but it was recognised that antigens and their corresponding antibodies reacted in optional proportions and in the case of the prozone phenomenon one had too much antibody in the first few tubes, but why it should happen so frequently with the Brucella group it was difficult to say. Concerning normal agglutinins in equine

sera for *Pf. mallei* he had looked up some of the earlier work of which Mr. Gorton thought so highly and there appeared to be no marked difference between the titres from horses where the disease was endemic and those where glanders was absent. He, therefore, came to the conclusion that the agglutinins were not due to a previous infection with the glanders bacillus, but probably some other factor. Dr. Scott had referred to agglutinins in a calf suckling an infected cow and in this case the calf would obtain agglutinins from the colostrum of the cow. That would mean there would be agglutinins present in the calf within an hour or even less, but they would be passive antibodies and, correspondingly, there would be a passive immunity and that was probably the reason why calves were not usually infected with *Brucella abortus* during early life.

Agglutinins produced in an animal largely depended upon the dose of bacteria invading or multiplying in the animal body and probably that would be the answer to the question as to any differences in the agglutinin content of serum in animals naturally infected and those infected artificially. Those naturally infected had in all probability not one dose of infection but many doses and in the case of a persistent high titre it might be due to re-infection. He believed that the porcine type of Brucella was recognised as being more virulent than the bovine and was very prone to produce undulant fever in man. The suggestion that porcine infection might occur in Ireland was rather interesting because he knew of no records of any large scale attempts to establish its presence in that country. There were methods of distinguishing between *Brucella abortus* and *Brucella melitensis*, but it was rather difficult because one had to consider many different tests and serologically a careful quantitative agglutinin absorption test was necessary. With regard to Mr. Caldwell's question, if one infected a non-pregnant cow the organisms would not multiply to the same extent as in a cow that was pregnant and this would probably be the clue to the sudden rise of agglutinins after abortion. As to testing the whey for streptococcal antibodies, the easiest way of diagnosing streptococcal mastitis was to isolate the organism and if one were going to differentiate by serological methods then powerful sera were necessary. Furthermore, whey was usually negative for streptococcal antibodies even in cases of prolonged mastitis. Mr. White asked how long the agglutinins might persist in the blood of an animal. He could only judge by analogy with some of the human diseases; for example, in typhoid fever it was known that agglutinins might be present in the serum for years after recovery. With regard to cattle and *Br. abortus*, he did not know, but would think the agglutinins might persist in the blood for some years even when there was no re-infection. But if one had a titre of 1: 10 and it remained so over a very long period of time he would assume that cow had got over its infection, but there would still be an element of risk in replacing it in a clean herd. Mr. White had also asked a question with regard to sheep and pigs. What he said was that as far as he knew, Brucella infection did not occur in sheep or pigs in this country. The commonest cause of abortion in sheep in this country was *Salmonella abortus ovis*. He did not know whether normal agglutinins were a protective agency, as the available data were so confusing. Their President seemed to have been in rather a difficulty over four samples of blood as to why the results should be sometimes positive, sometimes negative and sometimes doubtful. He did not know what the answer was, but one possible explanation was that the antigens were of a different sensitivity or a different opacity. That was one of the advantages that would accrue from having one laboratory producing large quantities of a standardised suspension. They were trying to eliminate false reactions and they would get false reactions if they used a strain that was too sensitive. It was recognised that the porcine type of Brucella was more virulent for man than the bovine type, but even so he thought that one should not minimise the infection of human beings with the bovine type which was present in this country. With regard to the question put by Mr. Martin, he believed the general opinion at the moment was that "abortin" was not so delicate a test as the agglutination test and with regard to Mr. Gorton observations, he would like to point out that there had been a great advance in certain spheres of bacteriology, particularly concerning antigenic structure, the chemical nature of certain reactions, and in actual fact we could deal more exactly with our reactions to-day because our methods enabled us to obtain purer reagents.

DURBAN AND MUNICIPAL VETERINARY HYGIENE

H. H. CURSON and W. A. DYKINS

Introduction

Although historical information on the veterinary aspect of the municipal health service is scanty, no opportunity should be missed of recording all available details. As has been noted,[1] the early years of Johannesburg are more or less familiar, but with the appointment of Colonel J. Irvine-Smith, M.R.C.V.S., in 1907, and the development of the public services, precise details are easily obtainable in the excellent annual reports of the Director of the Johannesburg Livestock Markets and Abattoir. Since 1930 a veterinarian (Dr. G. Martinaglia) has been in charge of dairies. Regarding the Mother City, however, we have but meagre details, and these concern only the veterinarians who have been employed in municipal service.[2] With the appointment of Mr. John Forrest, M.R.C.V.S., in 1920 as Superintendent of the Maitland Abattoir, veterinary inspection has improved, but the milk supply still awaits veterinary control.

The Abattoir

In a publication entitled *Durban: Fifty Years' Municipal History*, by W. P. M. Henderson and published in 1904, reference is made to slaughter

[1]For Notes on Johannesburg Municipality by one of the authors (H. H. C.) see *Jl. S. A. Vet. Med. Ass.* Vol. i, p. 39.

[2]For Notes on Cape Town Municipal Veterinarians by J. Spreull, see *Jl. S. A. Vet. Med. Ass.* Vol. iv, p. 57.

houses, it being stated that " in 1881 the Slaughter Houses were recognised as being a nuisance and a menace to the health of the town." It is surmised that slaughter houses must have been established (site not mentioned) about 1854, when Durban was created a municipality, and before this (foundation of Durban, 1824) slaughter poles were erected wherever necessary.

From the source just quoted, it would appear that between 1881-88, no finality could be reached as to where the proposed slaughter-houses should be erected. It seemed impossible to satisfy not only the Sanitary Committee of the Town Council and the butchers, but also the residents of the neighbourhood selected. In 1886, certain regulations drawn up by the Sanitary Committee so displeased the butchers that " in 1887, the Council gave six months' notice to the butchers to cease slaughtering cattle, sheep or pigs within the Borough. The Council were, however, advised that the law only conferred power to control and not to prohibit." In any case, all difficulties came to an end in 1888 when the butchers selected " a site at Cato Manor, outside the Borough."

From 1888-1914, slaughtering was carried out mainly at Cato Manor,[3] but owing chiefly to the vision of Councillor the Hon. R. Jameson it was agreed by the butchers, as far back as 1904, that a Municipal Slaughter-house was essential. At this date " the approximate consumption of meat in Durban averaged 1,500 oxen, oxen, 6,000 sheep, and 1,500 pigs per month." Shortly afterwards an abattoir was built by the Government at the Point (between Port Captain's office and the Gaol) for slaughtering cattle from East Coast fever areas. It would appear that control passed to the Municipality in April, 1912. In January, 1913, Captain W. G. Barnes, M.R.C.V.S., became Director.[4]

Just previously it had been decided to erect an entirely new building, the present site in Williams Road, Congella, being accordingly selected.[5] In November, 1914, the present abattoir was opened, and adjacent to it is the Livestock Market.

In 1913, the Medical Officer of Health (Dr. P. Murison), whose Department (Public Health) had included the abattoir since 1910, visited Europe on leave and while there inspected the abattoirs of many towns, particularly in Great Britain and Germany.

On the opening of the Williams Road Abattoir in 1914 (Mayor's Minute of 1914, p. 131, states " July ") an independent Abattoir Committee was appointed and " Captain Barnes took over all matters connected with the work."

In March, 1915, Captain Barnes was recalled to Great Britain for military duty,[6] and in his absence Dr. Murison, the M.O.H., took charge of the abattoir, but to assist him two trained meat inspectors were obtained from London. Dr. Murison, in his annual report, refers to the large amount of meat condemned " which fact alone abundantly justifies your policy of the adoption of the abattoir as a health institution and only secondarily a trading concern." He also complained of defective bye-laws.

In 1916, a scheme of insurance for beef carcases condemned for measles was drawn up (but shelved until 1924), and reference was also made to the development of a meat export trade.[7] In 1917, details were given of cruelty in transit of the livestock by rail, and reference was again made to a meat export trade as being most profitable to the abattoir. An appeal was made to to the Council not only to retain this business but also to lease cold storage sites adjacent to the abattoir, and generally to centralise all slaughtering and storage.

On July 17th, 1918, the bye-laws which had been drawn up in 1915 (including legal provision for the destruction of condemned meat) were promulgated and the By-product Plant was accordingly reopened.

In 1920, Major Barnes, M.R.C.V.S., M.C., was recognised by the Acting Principal Veterinary Officer, Union, as an approved veterinary surgeon to carry out the duties specified in Section 115 of the Public Health Act (Union), No. 36 of 1919. It will be remembered that, had it not been for Colonel Irvine-Smith, who gave evidence before the Select Committee of Senate on behalf of the Transvaal Veterinary Medical Association, municipal veterinarians would not have been allowed to destroy any unsound article of food.

In 1922, Major Barnes stated that the chief cause of condemnation of beef and pork was measles.[8] In this year he was appointed Inspector of Dairies (under the Dairy Industry Act No. 16 of 1918). In 1924 the insurance scheme (2s. 6d. per head on all cattle over one year entering

[3] At this and other villages surrounding Durban local slaughtering came to an end in August, 1932, when the areas in question became incorporated in the Borough of Durban.

[4] Letter of November 8th, 1924, from Town Clerk.

[5] " Only about a third of the town's meat supply is prepared in this abattoir " (*i.e.*, Point) (*Mayor's Minute of* 1913, p. 151).

[6] On outbreak of hostilities, Captain Barnes was temporarily attached to the Natal Mounted Rifles as V.O. (*Mayor's Minute of* 1915, p. 8).

[7] Information kindly supplied by Town Clerk. See foot-note [4]. The Town Clerk not only loaned copies of the Annual Reports of the Abattoir Director, but presented us with Mayor's Minutes for 1913-17 and 1922-25. The latter are now in the Library of the S.A.V.M.A., P.O. Onderstepoort. Although the Abattoir is an approved Abattoir for export purposes, most of this traffic is dealt with by private export abattoirs at Congella.

the abattoirs) was inaugurated, the consignor receiving payment in full for condemned carcases, the value being assessed by the Director and two others appointed by him.

In 1924, owing to the cotton boom, the demand for Abattoir by-products was greatly in excess of the production and this in spite of the competition of chemical firms, *e.g.*, Messrs. Kynoch's & Co., Umbogintwini.

In 1925, the capitation charge in the Indemnification Fund (Measles) was raised from 2s. 6d. to 3s. per head owing to heavy demands upon the Fund in 1924.

In November, 1932, Major Barnes retired from the post of Municipal Director, having upheld for 20 years the honour of the profession. His successor was Mr. W. A. Dykins, M.R.C.V.S., who was appointed November 28th, 1932. Major Barnes acted as consultant up to January 31st, 1933.

Dairy Control

Reference has been made to the fact that in 1922 Major Barnes was appointed Inspector of Dairies, within the Municipality. As this official had his hands full with abattoir duties, the control of milk, chiefly for tuberculosis, was a matter not for the Abattoir Department but for the Public Health (Municipal) Department under the M.O.H. Little or no work was done in this direction (except in 1925 when milk bye-laws were passed) until 1930. In this year the Municipality put aside a certain sum of money, £1,200, as a "grant in aid" for compensation, provided the diagnosis was undertaken by the Division of Veterinary Services, Department of Agriculture. Mr. W. J. B. Green, B.V.SC., was appointed to undertake this formidable task and some of his experiences are contained in a paper "Notes on the Double Intradermal Tuberculin Test," carried out in Durban and Neighbourhood, which appeared in the *Jl. S.A.V.M.A.* of March, 1933. Dr. de Kock, too, has published papers on "The Bovine Tuberculosis Problem in South Africa," in which he recorded much of the experience he gained in Durban. (See *Jl. S.A.V.M.A.*, Vol. iii, Nos. 2 and 3, 1932, and *S.A. Med. Jl.*, 1934).

In 1932, the Municipality appointed to their Public Health Department a full-time Assistant Veterinarian (Mr. A. F. Harber, M.R.C.V.S.) in order to supervise the dairies and cows, the usual inspection by Sanitary Inspectors obviously not having been sufficient.[9]

[8]Condemnations appear to be on the increase. From Natal proper the percentage is 3·25, and in the case of cattle from Swaziland 5·25 per cent. The capitation fee is now 5s. and 7s. per head in the case of cattle from Swaziland.

[9]Mr. Harber succeeded Mr. Dykins, who was the first veterinarian in the Public Health Department of the Durban Municipal Service, having been appointed March 14th, 1932.

Miscellaneous

(*a*) The Director of the Abattoir is also Director "of the Corporation Transport Department, and is responsible for veterinary attention to all Corporation horses, mules, etc."[4]

(*b*) In the Mayor's Minute of 1913 (pp. 209-210) interesting veterinary information is contained in the Report of the Zoological Department, Mr. J. D. Casey, the Curator of the Zoo, being apparently the official to whom this was due. He refers (i) to the outbreak of anthrax among animals of the Ungulata family and subsequent inoculation of incontacts by the Pasteur method[10]; (ii) to cholera among water fowl and vaccination "with the virus (serum from inoculated rats). This treatment checked any further spread of the disease," and (iii) to gastro-enteritis among hoofed animals, tuberculosis of monkeys, and distemper and intestinal parasites in carnivora being "less troublesome than formerly."

It is known that in later years, *e.g.*, 1932, Mr. S. T. Amos, F.R.C.V.S., was the veterinary surgeon of the Zoo.

(*c*) In 1932, the Livestock Market was completed at a cost of £14,000.

[10]The details of bacteriology seem obscure to the official responsible for the report. Diagnosis may have been made either by the local Government Veterinary Officer, or by the Laboratory of the Public Health (Municipal) Department.

"A CHAMBER OF LIFE"

The Rockefeller Institute for Medical Research announces the invention, jointly by Dr. Alexis Carrel, of the Institute, a Nobel Prize winner long famous for his work in medicine and surgery, and Colonel Charles A. Lindbergh, the airman, of a "life chamber"—a sort of artificial body—a "heart," "lungs," and a "blood-stream" which has enabled men of science for the first time to keep the vital organs of man and other animals alive and functioning for an indefinitely long period outside the body. Colonel Lindbergh's contribution to the joint effort is the invention of the "chamber of life," in which the entire organs are not merely kept alive but even grow.

The method (the Carrel-Lindbergh report says) consists of the transplantation of an organ or of any part of the body into a sterile chamber and of its artificial feeding with a nutrient fluid through the arteries. It is not in any way a substitute for tissue culture. Its technique as well as it purposes are quite different. . . . It is through the employment of complex mechanism and surgical procedures that whole organs are able to live isolated from the body. Tissue culture deals with cells as units of bodily structure; the new method deals with cellular societies as organic wholes.

* * * * *

When the Royal Horse Artillery gun teams had been judged at the recently-held Aldershot Show it was announced that they were making their last appearance at the Show as a horse unit, as the brigade is to be mechanised, and the spectators rose to their feet when the massed bands played "Auld Lang Syne."

The Veterinary Record

July 20th, 1935.

RINDERPEST ERADICATION

ELSEWHERE in this issue appears a review of the Annual Report of the Chief Veterinary Officer of Nigeria, in which, as in most other reports emanating from the different British African colonial territories, the importance of rinderpest eradication in Africa is stressed.

There is little doubt that this plague continues to claim a heavy toll of animal life and to be a serious hindrance to the economic welfare of the farming communities throughout vast areas of Africa and Asia and a menace to neighbouring territories which for the moment enjoy freedom from it. The death-rate from the disease in the two continents is not easy to assess but it is likely that it exceeds one million head of animals each year. This is not the only loss, however. The impoverished state of affected communities following continued ravages of the disease depresses their general well-being and keeps productivity, not only in livestock but agriculture as a whole, in subjection. It is well known that pure agriculture is best served by mixed farming and scarcity of livestock is a serious handicap to its progress. This is well exemplified in some parts of Africa where there is a deficiency of domestic animals. Furthermore, the health of the human population in some areas suffers to a considerable extent through an insufficiency of meat and other animal products and in most cases this is attributable to rinderpest alone.

Although the risk of the infection spreading to "clean" countries is not great, where, as nowadays, adequate precautionary measures are being and can be applied, yet there are such countries where reliable measures cannot be operated. We may cite but one example, namely, the southern parts of Africa, parts which as it happens carry the most valuable livestock of that continent and which were freed of the disease some years ago at enormous expense and trouble. Those "clean" areas of Africa are in constant danger of re-infection by the migrations of susceptible game, if through no other medium, from infected areas in the north. A similar position exists in some of our colonies in mid-Africa, which have recently succeeded, through vigorous suppressive measures, in subduing if not entirely eradicating the disease. Those colonies are now faced with but two alternatives, both equally irksome and very costly, *viz.*, to continue to immunise the annual crops of young susceptible stock or to guard their widespread frontiers by an inadequate police force and quarantine stations.

In view of these considerations we feel that Capt. Henderson's appeal for a united attack on the disease in Africa by all concerned is both timely and deserving of the fullest consideration by our own authorities and those of other European Powers concerned with the welfare of that great continent.

We would strongly commend to all governments concerned the resolution passed by the International Veterinary Congress, held in England in 1930, which was as follows :—

"That this Congress considers that sufficient knowledge of practicable methods is now available to eradicate rinderpest within a reasonable period of time in any country which will provide adequate facilities for their application, and this Congress urges upon all governments to co-operate to this end."

N.V.M.A. QUARTERLY MEETING OF COUNCIL

Summary of Proceedings

A Scottish representation of two-thirds in the attendance at the July meeting of Council, N.V.M.A., held at Edinburgh on July 2nd, may be held to justify the policy of conducting the business of the Association over the Border once a year, but it is to be regretted that the length of the list of those present was so greatly exceeded by that indicative of absent members.

Throughout the afternoon Council were largely engaged in considering the varied aspects of those recent developments of departmental and local authority activity which, affecting as they do the livelihood of a large proportion of the profession, illustrate with the greatest force the indispensable nature of the service which the National Association can render in safeguarding the interests of all concerned.

The plunge into these somewhat troubled waters was taken with the Correspondence, in the form of a letter from the Economic Advisory Council stating that the minutes of evidence submitted to the Committee on Cattle Diseases could not be published as this would be contrary to the terms of the Treasury Minute under which that Council was established. In connection with the evidence of that Committee the Council were informed that the Scottish Branch had approved, and had taken steps to secure their adoption by the Scottish bodies concerned, of all the recommendations contained in the report thereupon of the Special Committee of the Association.

An abrupt return to the domestic aspect of "National" affairs was made in a letter from Professor Macqueen, who revealed a healthy indisposition to let sleeping Branches lie. Why, he asked, with great appropriateness, was the Scottish Branch the only one to function ; are

the others still alive and, if so, what hinders them from giving evidence to that effect? The question still awaits answer from those whom it may directly concern.

Apart from the above-mentioned "blank spots," the official eye of the Association is gratifyingly aware of progress in other and perhaps more important directions; for example, the accession to the Association of newly-formed Divisions, reported to the last meeting, is now supplemented by a record membership figure of 1,706.

The reports of the Standing Committees revealed, as always, the measure of the success or failure of the Association in "bearing the burden of the day." That burden has increased enormously of late, but it would seem that the Association is standing up well to the strain of presenting to the "powers that be" a united front on behalf of what is inevitably something of a sectional community. However, the first Committee report—the Organising—offered no difficulties of that kind, for the profession are at one as to the desirability of impressing upon the R.S.P.C.A. the necessity for limiting to the animals of poor persons the treatment given at dispensaries run in co-operation with the profession. It is only right to say, nevertheless, that while such a reminder is absolutely essential to preserve the vital principle where breach of it occurs, instances of this are few and far between. Had matters been otherwise, Council could not have proceeded to make the further request of the R.S.P.C.A. that the fact of the restriction should be advertised as widely as possible.

As had been anticipated, the "composite fee" proposal has not been long in revealing itself as a question of the first magnitude in relation to the organisation of the N.V.M.A.: it is equally clear, however, that its solution will be anything but readily found. The replies from the Divisions indicate an almost universal desire to be placed in possession of fuller details as to the financial aspect of the proposal before committal to any action, and with this information they are to be supplied by the Finance Committee. We may say, emphatically, that it is with the same desire to increase the amount of pure gold in the Divisional link that the associated bodies are to be asked to base the number of their representatives to Council, N.V.M.A., on the number of members of the Division whose names appear on the register of the Association.

The business of the Parliamentary Committee brought the Council back into the departmental arena. It was agreed to request the Ministry of Agriculture to afford the Association the opportunity of passing observations on any Orders that may be made in the Diseases of Animals Bill, the object of which is to enable the Ministry to bring certain infectious diseases of poultry within the scope of the Diseases of Animals Acts and, of yet greater potential value, to provide for the regulation of the manufacture of certain biological substances capable of being used for veterinary purposes.

From a Joint Meeting of the Parliamentary and Veterinary Officers and Public Health Committees came observations on the new Milk (Special Designations) Order, of which the Council approved for presentation to the Minister of Health. There is now, we are thankful to say, good ground for hoping that we shall see and hear the last of that appalling misnomer "grade A" as applied to third-quality milk.

In single-minded accord the Veterinary Officers and Public Health Committee passed on with regret the information that the Lanarkshire County Council had decided not to depart from their present procedure in regard to the nomination of whole-time officers only for the testing of cattle under the Milk Special Designations Order (Scotland) 1930, and had expressed the view that no good purpose would be served by receiving a deputation from the N.V.M.A., since they were assured that the existing arrangements meet with the approval of herd-owners, and further that the County Council believed that the method now operative (whereby the local authority carry out those tests at a nominal fee) was the best that could be arranged in the public interest. Apparently it has come thus early to this, even in Scotland, that the practitioner cat can no longer hope to be allowed a glimpse of the local authority king, and the Council felt that in the face of this it had no option but to accept the position.

By their adoption of its report, the Council accepted the opinion of the Committee that the fees for the examination of herds under the Accredited Scheme were best left to local discretion, and that, in view of the varying nature of the arrangements made in the different counties, it was not practicable for the Association to lay down a national scale for this work.

The report of the Appointments Committee revealed that the "refusal" complex in Scotland extended to the Association of County Councils—the ban this time being against a deputation regarding the salaries of whole-time veterinary officers, despite the fact that the English Association has received a deputation on the subject from the Association and in consequence has circularised its members with the N.V.M.A. scale, being of the opinion that it was in the interests of the Veterinary Service that there should be some measure of uniformity. In the hope of achieving this end by indirect means Council decided that a copy of the scale should be sent to all County Authorities in Scotland.

More satisfactory features in the report of

this Committee were, first, the result of the deputation which waited upon representatives of the Worcestershire County Council with regard to the salary for the new post of County Veterinary Officer and, second, the receipt of information from the Veterinary Medical Association of Ireland that a partial settlement had been arrived at in the dispute which existed between veterinary officers and the Irish Free State Department of Agriculture in regard to the remuneration to be offered for whole-time appointments.

At first sight it would appear only logical that assistants in private practice should have the same benefit as is now enjoyed by veterinarians in whole-time service in other spheres, of a place in the Association's scale of salaries. Unfortunately, their high degree of appreciation of the fact that no members of the profession may be more worthy or in need of such a safeguard could make other than inevitable the Council's decision to adhere to its formerly expressed view that it was practically impossible to secure the adoption of such a scale.

In view of the number and nature of the suggestions for spending the Association's money, with which the Finance Committee has been bombarded of late, the word "High" would not seem out of place in its title, and at the outset of their report the Committee showed a due appreciation of its responsibilities by seeking to transfer to the shoulders of the Branches and Divisions concerned any payments which might be decided upon in consequence of the receipt of a resolution from the Scottish Branch asking that, in view of the poor representation from Scotland on the Committees and Council of the N.V.M.A., payment should be made of the expenses of one representative from the Branch and each of the Scottish Divisions. The Council, however, referred the matter back to the Committee in order that it might be ascertained if it would be possible to meet the wishes of the Scottish representatives to the extent that their travelling expenses only be defrayed by the Association. Council accepted, with comparative readiness, the recommendation of the Committee that the expenses of the following should be borne by the N.V.M.A.: (1) members appointed to attend conferences of other bodies, unless otherwise appointed; (2) members of deputations from the Association; and (3) members of special committees.

Special committee reports are now become a regular and important feature of the governing body of the Association. It is satisfactory to know that the Euthanasia Committee is nearing the end of its labours and that its Report is in course of preparation, while it is evident from their reports that both the Advisory Committee on Poultry Diseases and the Special Committee on Fur-bearing Animals, etc., are taking very seriously their task of keeping the profession in touch with the problems facing the industries with which their activities are respectively concerned: the perusal of these reports reveals a remarkable number of valuable recommendations in this connection.

On an afternoon which, both within and without the temporary Council Chamber, was somewhat exhausting, it was a refreshing relief to applaud in full measure the decision of the special committee charged with awarding the Dalrymple-Champneys prize to bestow this handsome trophy upon so popular a member as Mr. Thomas Dalling, the outstanding merit of whose published work is acclaimed by all.

In these days the Council finds it a difficult matter to get away from the subject of the testing of cattle, and at the end of the afternoon the Society of Veterinary Practitioners came along with a request for the appointment of a special committee to investigate the subject of free tuberculin testing. It was agreed that a special meeting of the Joint Committee to which reference has previously been made should be called for the purpose of considering this matter.

VETERINARY INSPECTION IN WILTSHIRE

At a meeting of the Wiltshire Agricultural Committee a suggestion by the County Medical Officer that all the members of the county's permanent veterinary staff should be appointed veterinary inspectors under the Diseases of Animals Act was approved. The medical officer's report stated that these duties could now be efficiently and conveniently performed by the County veterinary staff instead of by the employment of private veterinary practitioners at considerable expense.

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HOME OF REST FOR HORSES

On Wednesday of last week the Duchess of Portland formally opened the Home of Rest for Horses, which has been removed from Cricklewood to a new site of about 25 acres at Boreham Wood, Herts, and erected at a cost of over £25,000. The stabling of the home consists of 75 loose boxes, and there are dressing stalls, isolation boxes, a forge, a fully-equipped pharmacy, and a forage barn. During the year 274 animals have been accommodated. Before the opening ceremony the Duke of Portland presided at the annual meeting, and was re-elected president, a position he has held since the year after the beginning of the home in 1886. In his presidential address he made an appeal for funds. Sir Frederick Hobday, principal of the Royal Veterinary College, described the home as a God-send to the costermonger and small contractor of London.

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The foaling season in the North-East of Scotland has resulted in a considerable mortality both amongst mares and foals. The losses amongst foals have been mainly attributed to "joint-ill."

Clinical Communications

TOXIC EFFECT OF LINUM CARTHARTICUM IN HORSES

R. H. LAMBERT, M.R.C.V.S.
DUBLIN

On March 20th, I was called to attend a stable of 22 carriage horses, all suffering from a severe form of purging. The history was very short, the horses being in good health on the previous night. On this morning, when going out to work, some of the horses appeared to be very dull, the fæces being soft. When examined at the lunch hour some were purging very severely, others lightly, and a couple were not affected. Some of the drivers stated that they had great difficulty in getting their horses home as they were purging so greatly and seemed very weak.

Enquiry revealed that a fresh load of hay was fed to the horses on the evening of March 19th, and that most of the horses refused that hay on the 20th.

Feeding with that hay was stopped and a sample of it was taken to a botanist for examination. He reported that it was a sample of good mountain hay which contained *Linum catharticum* or purging flax (as illustrated), which is liable to cause purging if fed to horses. Poppy was also present in the hay, a rare field companion for *Linum catharticum*.

Treatment consisted of stopping the hay, giving mashes, and a dose twice daily of collosol kaolin. A fresh load of hay was ordered and fed as recovery took place. Recovery was uneventful, occurring in from two to six days.

A few interesting phenomena were noted—the aged horses were more severely affected and took longer to recover than the younger horses. Of the 22 animals, 14 were severely affected, six slightly (they had recovered the next day) and two horses showed no symptoms although the affected hay continued to be fed to them, and also to a pony in the same yard, without ill-effects.

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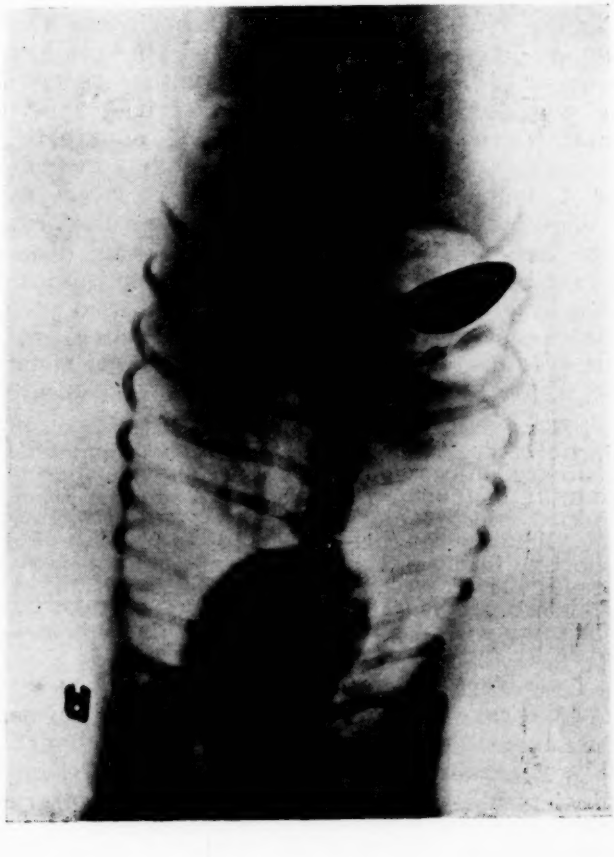
REMOVAL OF SPOON FROM A TERRIER'S STOMACH

O. STINSON, M.R.C.V.S.
APPLEBY

The subject was a Lakeland terrier, about 15 lbs. in weight. There was an absence of symptoms other than slight nervousness and loss of appetite. Palpation of the abdomen revealed no evidence of foreign body in the stomach and only slight rigidity of the abdominal muscles, which might have been voluntary, was present on examination.

The operation was simple and the patient made an uninterrupted recovery.



Annotation

THE SO-CALLED "DEVELOPMENTAL CYCLE" OF THE VIRUS OF PSITTACOSIS

[**1.—The Growth and Development of Psittacosis Virus in Tissue Cultures.** Bland, J. O. W., and Canti, R. G. (1935.) *J. Path. Bact. 40.* 231.

2.—Psittacosis in the Developing Egg. Burnet, F. M., and Rountree, P. M. (1935.) *J. Path. Bact. 40.* 471.

3.—Recent Observations on Psittacosis. Levinthal, W. (1935.) *Lancet,* 1. 1207.]

It is necessary before discussing the subject matter, contained in the above three papers, dealing with the morphology of the virus to give due consideration to what has gone before. Levinthal (1930) ["Die Ætiologie der Psittakose" 1er Congrés internat. de Microbiol. 1930. Paris. Masson et Cie] in view of the occurrence of variation in the form of the virus in stained preparations suggested for it the name "*Microbacterium multiforme psittacosis.*" Later Bedson and Bland (1932) [*Brit J. Exp. Path. 13.* 461] reported that they had obtained evidence that when the virus multiplied either in the tissues of a susceptible animal or in growing tissue cultures it passed through morphological changes which occurred in regular sequence. Following infection with "elementary bodies" the first form of the virus detectable microscopically consisted of apparently homogeneous masses referred to as "plasmodia" or "plaques" which were soon replaced by "morulæ" of bodies of more or less uniform size and about 1μ in diameter. Later these "large forms" showed evidence of multiplication by division and with the division and subdivision of the virus particles there was a progressive decrease in size resulting in the virus returning to the state of "elementary bodies."

[These so-called "elementary bodies" or virus particles are sufficiently large to be visible to ordinary microscopic examination by special staining methods. Levinthal, by examination of stained microscopic preparations, had estimated the diameter as between 0·2μ and 0·4μ. By selective filtration through Elford's graded membranes the diameter of these infective units has been estimated as from 0·2 to 0·3μ, so there is remarkably good agreement between the estimates made by the two methods.]

They further stated that, "such a cycle: "elementary body" —> amoeboid forms running together to form a "plasmodium" —> "morula" —> division and subdivision of elements of "morula" —> "elementary bodies," carried with it the implication that the virus is not a bacterium but possesses affinities with the mycetozoa or myxomycetes or possibly with the microsporidia." Further, that their findings "left no doubt that the virus of psittacosis passes through a developmental cycle of which the "elementary body" is the last phase and that it must be emphasised that "not only are these various stages quite evidently linked in morphological sequence but also in time." They therefore inclined very strongly to the hypothesis that the virus of psittacosis possesses protozoan rather than bacterial affinities. The results of experiments made by Bedson (1933) [*Brit. J. Exp. Path. 14.* 267] to obtain confirmation of this protozoan hypothesis were inconclusive but it became apparent that he was already veering from the original conception and considering the possibility that the homogeneity of these early masses, "plasmodia" or "plaques" is only apparent and that in reality they are aggregates of virus particles whose detail is obscured by inclusion material. An interesting observation made was that these so-called "plaques" are basophilic and not acidophilic like an infectious ectromelia "inclusion body" for example, and he observed also that the "plaque" is not always easy to identify with certainty. "In the case of intracellular material in imprint preparations it was often found impossible to distinguish between "plaques" and broken off portions of basophilic cytoplasm."

Later in an interesting paper Bedson and Bland (1934) [*Brit. J. Exp. Path. 15.* 243] showed by careful persistent differentiation of fixed material that the apparently homogenous masses, "plasmodia," or "plaques," seen in the early stages are particulate. They therefore withdrew their original hypothesis and stated that in their opinion the virus of psittacosis is a micro-organism with bacterial affinities which is essentially an intracellular parasite and which in the early stages of multiplication produces forms much larger than normal. They had therefore found the protozoan hypothesis to be untenable but they still hold to the opinion, Bedson (1933), Bedson and Bland (1934), Bland and Canti (1935), that during the multiplication of the virus a developmental cycle is followed for they state, "Whether the 'elementary bodies' are capable of multiplication without departing from that form we do not know but in our experience when the 'elementary bodies' gain access to a suitable cell either in the animal or in tissue culture they are soon and invariably replaced by 'large forms.' These 'large forms' apparently multiply for a short time without much change in size, but subsequently there is a progessive decrease in size as multiplication proceeds until the stage of 'elementary bodies' is reached

again." What they insist on, Bedson and Bland (1934), Bland and Canti (1935), is the regularity with which in the tissues of a susceptible animal or in tissue cultures the sequence of forms described occurs and that provided an adequate dose of a strain of high and "fixed" virulence is inoculated one can predict with certainty the form in which the virus can be found in the spleen of a mouse killed at any given time or in a tissue culture examined at a given interval, after infection with virus. In fact, that the regularity with which the sequence of morphological changes occurs suggests a true developmental cycle.

[Bedson (1933) and Bedson and Bland (1934) have stated that they hold the opinion that the "large forms" by repeated division give rise to the "elementary bodies." Further, that virus in the form of "plaques," "morulæ" or "large forms" is of relatively low virulence when compared with the virus in the form of "elementary bodies" and that this lower virulence is probably due to the greater difficulty which they experience in getting inside cells and reaching the environment essential to their growth. As an outside observer one would like to be convinced (the evidence so far produced is not conclusive) that the so-called "large forms" do actually divide to give rise to "elementary bodies." Again, how can it be stated with certainty that the "large forms" are of low virulence or indeed are virulent at all? It would appear that the infectivity of spleen tissue in which only "large forms" can be demonstrated in a microscopical preparation may be due to the presence of a very small number of "elementary bodies" which escape detection and that the lesser infectivity of an "early" as compared with a "late" spleen may be quantitative rather than qualitative. Bedson (1933) indeed has himself agreed that it is recognised that the identification of "elementary bodies" when they are present in small numbers is a matter of extreme difficulty and that it would be impossible to speak with certainty of their absence.]

Bland and Canti (1935) who have examined the virus of psittacosis grown in cultures of chicken embryo tissue, in stained preparations, in living cultures examined by dark ground illumination and by transmitted light, and in quick motion cinematograph films believe that "although the reconstruction from dead material of a cycle of changes such as occurs in the development of psittacosis is ever open to suspicion, when the whole sequence can be seen taking place before one's eyes in the living specimen and can be presented in the form of photographs, doubt vanishes." In referring to colonies in cultures examined by dark-ground illumination they say that "they stand out like so many glittering jewels shining with a brilliant silvery light that sharply distinguishes them from the golden colour of the other structures. The contrast between the bluish-white light emitted by the colonies of virus and the yellow light of the other components of the cells is comparable to the difference between moonlight and sunlight." This must be exceedingly pretty. If, as they say, it is a distinguishing feature of the virus at all periods of its development and is an aid to its identification in the earlier stages, this is rather surprising. Those who have made much use of the dark-ground field for microscopic examination will know how often one may encounter "glittering jewels shining with a brilliant silvery light" in preparations made from uninoculated tissue cultures.

Levinthal (1935) and Burnet and Rountree (1935) interpret the appearances seen in cultures or in the tissues of infected animals somewhat differently from the other group of workers. Although they have examined material from different types of culture medium, developing egg chorio-allantoic membrane [Burnet and Rountree], chick embryo tissue culture medium and infected mouse tissues [Levinthal] their conclusions are very similar. They are not of the opinion that the occurrence of the different forms observed follows by an immutable law a regular cyclical series of changes; they appear to differ from Bedson and Bland and Bland and Canti in their interpretation of the relationship which the different forms bear to one another although they agree that all the appearances described by Bedson and Bland may be encountered.

Burnet and Rountree state that in their experience compact appearances which could be termed "plaques" or "morulæ" are exceedingly rare and do not seem to be a necessary stage in the morphological development of the virus. None have been observed in duck egg material. According to these authors the simplest interpretation of the sequence of changes is that the early growth of the virus in a new susceptible cell does not result in any truly coördinated multiplication, the subdivision of the growing mass being irregular and very susceptible to environmental influences. If the internal condition of the infected cell allows it, the separated fragments disperse under the influence of Brownian movement, but if the protoplasm is more dense or for some other physical reason prevents diffusion, the growing mass remains coherent and when suitably examined appears as a "morula." The final development to the virus cell packed with typical "elementary bodies" is the termination by either method of development.

Levinthal has inoculated two types of medium with virus (1) a freshly prepared chick embryo tissue medium, (2) a similar medium which had been incubated for some days before inoculation. In the first type of medium many different forms were observed, "large forms," "intermediate forms," "plaques" and intracellular colonies of "elementary bodies" often *at one and the same time*. In such a culture,

containing vigorously growing cells, in Levinthal's opinion, the immediate multiplication of the virus may be hampered by unknown factors. The virus passes through a latent period during which division is checked. The virus particles swell up and form a mass embedded in a deeply stainable matrix which obscures all detail. This enlargement may be due to the accumulation of nutriment in the virus particles. The result is an inclusion body ("plaque"). Later when the host cell weakens more and more, growth of the virus is able to take place and intracellular colonies of "elementary bodies" begin to appear.

In the second type of medium (personal communication) only intracellular colonies of "elementary bodies" were observed and presumably this was the result of a prompt and unchecked multiplication of the virus in cells the vitality of which had become diminished. The larger forms in Levinthal's opinion are not a regular initial stage of the virus but are forms arising whenever the ratio between nutrition and multiplication is temporarily disturbed.

The whole question turns on whether multiplication of the virus can take place exclusively in the form of "elementary bodies" or not. Taking into consideration the observations of Levinthal, and Burnet and Rountree, and the more recent results of Levinthal mentioned immediately above, one would be justified in concluding that it is possible. In fact, Bedson and Bland (1934) [*v. supra*] and Bland and Canti (1935) are not fully convinced that the possibility does not exist for they say "Whether the multiplication of the virus must take place by the developmental cycle or whether the 'elementary bodies' are capable of multiplying as such, we do not know; the enormous colonies of them found in old cultures suggest that they may possess this capacity."

I. A. G.

ARMY VETERINARY SERVICE

London Gazette—War Office—Regular Army Reserve of Officers

July 9th.—Lieut.-Colonel A. J. Thompson (June 19th) and Captain H. A. Idenden (June 18th) having attained the age limit of liability to recall, cease to belong to the Res. of Off.

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To assist in combating cattle disease, and to ensure that supplies of serum be readily available for the vaccination of animals, the authorities of French Sudan have decided to open two further laboratories in that colony. The first will be situated at Ouahigouya, on the route used for the export of cattle from the French Sudan to the Gold Coast, and the second, at Sotuba, will be responsible for supplying the necessary vaccine to French Sudan and the Ivory Coast.

Abstracts

[Studies on Normal Agglutinins. The Agglutination of *Pf. mallei* by Normal Horse Sera. Lovell, R. (1935.) *J. Roy. Army Vet. Corps.* *6.* 69-82.]

The assumption that agglutinins for *Pf. mallei* might point to previous infection with that organism would be justifiable if glanders is endemic in an area in which the study is made. With this in mind the author has examined the sera of 314 normal horses for agglutinins for that organism. All possessed agglutinins for *Pf. mallei*, the most frequent titre recorded with one strain being 1 : 320, with another strain 1 : 640. Although 250 of the horses had previously been tested with mallein by the intradermal palpebral test, there was no evidence of this test having any influence on the agglutination titre. Taking the data into account with the extremely low incidence of glanders in this country both in army and civilian horses, it is concluded that these agglutinins are not due to previous infection with *Pf. mallei*. This is borne out by the presence of agglutinins for *Pf. mallei* in the sera of a small number of cattle, pigs, goats and rabbits, animals which do not normally suffer from glanders.

Judged by absorption tests, these agglutinins are specific. They are not affected by heating at 56° C. for half an hour, and a strain highly virulent for the guinea-pig was agglutinated equally well as the two standard strains used.

Statistically there was some evidence that samples of sera from female horses showed a greater frequency at higher titres than those from males.

R. L.

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[An Adaptation of Sheather's Substitute for an Automatic Pipette. Holman, H. H. (1935.) *J. Comp Path. & Therap.* *48.* 1. 41-42.]

This article describes certain modifications of Sheather's automatic pipette for adding standard amounts of fluid to tubes, which is used in putting up agglutination tests [Sheather, A. L. (1928.) *J. Comp. Path. & Therap.* 41. 163]. In the modified apparatus a four-way tap is incorporated, so constructed that two adjacent pairs of apertures are linked. One aperture is connected to a reservoir of fluid, the adjacent apertures on either side are connected to measuring syringes, while the aperture diametrically opposite serves as the delivery tube. Whilst one syringe is being filled from the reservoir the other is discharging through the outlet, and *vice versa*. In this way loss of time, waiting for the measuring syringe to fill, is eliminated from the very tedious procedure of filling agglutination tubes.

E. J. P.

[**Blood Groups in the Horse.** Rüscher. (1934.) *Zschr. Veterinärk. 46.* 10. 388-397. (8 refs.).]

The author has demonstrated the existence of five blood groups in horses, observations being made on the blood of 93 horses of various breeds: 25·8 per cent. of the horses belonged to group A (anti B), 22·5 per cent. to group B (anti A), 40·8 per cent. to group ABO, 7·5 per cent. to group O (anti AB). In three horses (3·2 per cent.), a fifth group, AB (anti AB), was found.

The macroscopic agglutination test proved more satisfactory than the microscopic test. Hæmolysis was sometimes observed, especially in warm weather, and was prevented by heating to 56° C. to inactivate the hæmolysin.

Pseudo-agglutination was observed sometimes when the drawing of the blood and the test took place on the same day. On the following day, a reaction which previously was positive could no longer be read as such. This mistake can be avoided by allowing the test to stand for 24–36 hours.

Cold agglutination was observed in two cases, the temperature of the room being 10–11° C. Warming to 25° C. causes this difficulty to be overcome.

Inheritance of blood groups has not been definitely demonstrated, but there is some evidence of its existence.

The proportion of each group varies in different breeds of horses.

E. W. A.

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[**The Determination of Magnesium in Blood Serum.** Cunningham, I. J., and Josland, S. W. (1934.) *New Zealand J. Sci. and Technol. 16.* 1. 28-29.]

A modification of Denis' method in which the magnesium is precipitated as phosphate and the latter determined colorimetrically is described and found to give results in good agreement with large scale gravimetric estimations. Using this method the following values are obtained :— healthy cattle, 1·7–2·8 mg. per 100 c.c. ; sheep, 1·9–3·1 mg. ; rat, 2·0–3·0 mg. ; pig, 1·9–3·5 mg. ; cows with "grass staggers," 0·7–1·7 mg., the mean values being 2·3, 2·5, 2·5, 2·5 and 1·1 mg. per 100 c.c. respectively.

C. G. A.

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[**The Cultivation of the Virus of Infectious Ectromelia with Observations on the Formation of Inclusion Bodies** *in vitro.* Downie, A. W., and McGaughey, C. A. (1935.) *J. Path. & Bact. 40.* 1. 147.]

Infectious ectromelia is an enzoötic and epizoötic disease of mice and is of great importance to laboratory workers who use mice as experimental animals and to mouse breeders, in whose stocks it may cause tremendous losses.

It was described for the first time by Miss Marchal (1930) at the National Institute for Medical Research and shown by her to be caused by a filtrable virus. She described the characteristic inclusion bodies which develop in the skin and other tissues. Barnard and Elford (1931-32) studied the virus and suggested that the inclusion body is composed of an aggregate of elementary bodies enclosed in a homogeneous matrix. By means of filtration through graded collodion membranes and microphotography with ultraviolet light, they estimated the size of the virus particles to be 0·1 to 0·15μ. Within recent years many viruses which cause disease in man and animals have been successfully propagated in mice, *e.g.* psittacosis, Rift Valley fever, louping-ill of sheep, influenza of man, and therefore it is highly desirable that infectious ectromelia, a spontaneous virus disease of mice, should be thoroughly investigated. As a preliminary step in the study of immunity reaction, the cultivation *in vitro* of the virus was undertaken. This was successfully accomplished in a medium containing minced mouse embryo tissue, mouse serum and tyrode solution. Titrations were made by intraperitoneal and intradermal inoculations of mice. It was estimated that through the series of seven successive cultures the original virus had multiplied 6×10^{14} times. In subsequent culture in media modified in various ways it was found that the virus grew when no serum was incorporated, when fowl serum was used instead of mouse serum and when adult mouse kidney tissue was used instead of mouse embryo. Although not infective for fowls, the virus grew also in chick embryo with fowl or mouse serum added. The cultures were examined histologically and inclusion bodies were found to develop in the growing cells. The presence of inclusion bodies always indicated the presence of virus but there was some evidence that in certain cultures virus could be present although no inclusion bodies could be found.

Other observations, such as the concentration of the virus in the cells and the degenerative changes in the tissues, were made.

C. McG.

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[**Johann Gottlieb Wolstein. A Note on the Founding of the Veterinary School at Vienna.** Lechner, W. (1934.) *Wien. tierärztl. Mschr. 21.* 13 and 14. 285-395 and 417-428. (125 refs.).]

The author gives an interesting account of the life of J. G. Wolstein, who was responsible for the founding of the veterinary school at Vienna.

Wolstein was born on March 14th, 1738, at Flinsberg, in Schlesien. Little is known of his

childhood and education, but at an early age he began to study human surgery.

In 1760 he was persuaded by a client, a captain in the army, to go to Vienna, and this had a tremendous influence on his whole life. In Vienna he studied and practised surgery, medicine and obstetrics. Through the influence of a field-marshal in the army, he was chosen to be sent to the new veterinary school at Alfort, near Paris. This was the beginning of his training in veterinary science. In 1773 he journeyed to London and went to St. Bartholomew's Hospital, where he met John and William Hunter. He spent much time studying the breeding of English horses and sheep, and in 1775, left again for the Continent. He travelled through Holland, Hanover, Holstein and Denmark, and Berlin, always keenly observing the methods of animal husbandry and breeding, and gaining much knowledge.

He returned to Vienna and placed before the Emperor plans for a veterinary school. In general, the government was in agreement with his ideas, but for a long time nothing was done. There was disagreement as to the site of the school, as to the financial arrangements and even as to who should be its first principal. The ignorant, the prejudiced, and vested interests, stood in his way.

Eventually, however, the school was erected, and teaching began on January 1st, 1778. Wolstein was the principal and an army farrier named Schmid was second in charge.

Then followed for Wolstein, 17 years of hard work, teaching, practising, studying, and writing. All the teaching, with the exception of anatomy demonstrations and of lectures on medicines, was carried out by Wolstein himself. He published several papers on veterinary diseases, especially on epidemics. He supervised the erection of a veterinary school at Budapest and prepared plans for one at Brussels. His school was visited by Danes, Germans, Czechs, and Hungarians. In short, out of nothing, he created for Vienna an institute of international repute. He was the first to put veterinary medicine and surgery on a scientific basis, and to take it out of the hands of the quack and empiric.

In 1779 he became involved in a political dispute, and was put in prison for several months, and when released, was expelled from Austria with his wife and son. Thus Austria lost one of her most illustrious sons.

He travelled to Copenhagen, where he was knighted by the King. He was offered positions in several continental cities, but he refused them all, and devoted himself to his writing.

He died at the age of 82, on the 7th of July, 1820, and was buried at Altona.

A list of his writings is given.

E. W. A.

[**Ectopia Cordis in the Calf.** Hughes, H. V. (1934.) *J. Comp. Path. & Therap.* 47. 2. 141.]

Having mentioned the classification and literature of ectopia cordis, the author describes a case of the cervical type in a white shorthorn heifer calf which died 60 hours after birth. The heart occupied a fixed position in the ventral part of the neck, giving rise to a large swelling more prominent on the left side than on the right. The pretracheal muscles were ill-defined and formed a thin sheet of muscle over the ventral and lateral aspect of the pericardium. The thorax of the animal was abnormally short, with a wide entrance from the neck, and the sternum was exceptionally broad at its anterior part, its upper surface being widely depressed. The pleural sacs extended beyond the first pair of ribs over the surface of the pericardium. The lungs showed considerable areas of atelectasis and contained no cardiac notch.

The pericardium was complete but very elongated, the base being slightly behind the first pair of ribs and the apex opposite the fifth tracheal ring. It was supported by bands of fascia which separated it from the surrounding muscles. The heart itself was elongated, its base lying just within the thorax and its apex two inches behind the level of the cricoid cartilage. It was compressed from above to below and had a circumference of nine-and-a half inches at the auriculo-ventricular groove. A detailed description of the anatomy of the heart, the larger blood vessels, and the surrounding structures is given, the case being illustrated by three photographs and two diagrams.

In conclusion, the author points out that the ætiology of the condition is still undetermined. The position of the heart in this case suggests that it has been rotated around a transverse axis with its apex turning forwards instead of backwards. The abnormal structure of the sternum is noteworthy, suggesting that a definite fissure such as occurs in some cases of ectopia cordis has only just been averted. Finally, the author refers to the double anterior vena cava which is present in this case and gives possible theories for the anomaly.

A. B. O.

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the policy of eradication best suited to local conditions but see that the policy is actively carried out simultaneously in all the countries affected."

Space does not allow of a review of other features of this progressive department's work here, but the report is one which every Veterinary Officer in the Colonial Service should procure.

W. K.

Colonial Report

NIGERIA

Annual Report of the Veterinary Department for 1934

The staff of the department consisted of the Chief Veterinary Officer (Captain W. W. Henderson, M.R.C.V.S.), the Deputy Chief Veterinary Officer, Pathologist, Assistant Pathologist, Research Officer, three Laboratory Assistants, ten Stockmen, and a native personnel of skilled and unskilled assistants.

The work of the department was devoted chiefly to controlling and eradicating the major epizoötic diseases, particularly rinderpest, which at one time was widespread through the northern provinces of the Colony and caused a very serious loss of livestock. Some ten years ago the authorities decided to undertake a large-scale scheme to eradicate this plague and now, in such a short space of time, and in the face of great odds, this ambitious project is near completion. This achievement reflects the greatest possible credit on Captain Henderson who has organised and controlled it from the beginning. It is an achievement which the authorities of other rinderpest-stricken territories, in Africa at least, should seriously consider emulating if this devastating disease is to be exterminated from that continent within a reasonable time. Rinderpest, unlike some of the other infectious diseases of our animals, is amenable to relatively simple prophylactic measures and it is difficult to understand why more energetic action is not undertaken in some countries to get rid of it. Such countries are not themselves alone the victims of its effects, but they are a continuous menace to neighbouring territories which are free of the disease. In this connection the following quotation from Captain Henderson's report is published in the earnest hope that it may be brought to the attention of those concerned and that some action may result therefrom:—

"The annual mortality from rinderpest alone among the herds of tropical Africa, although impossible to assess accurately, must be enormous, and the cause directly and indirectly of economic losses of such magnitude as to warrant the serious consideration of all the governments concerned of a scheme for its complete eradication from Africa. The present policy of each country pursuing a campaign of self-preservation is leading nowhere . . . . To my mind an essential step towards this end is the formation of an executive body of responsible representatives of the governments concerned which will not only advise each government on

(*Continued at foot of preceding coloumn.*)

N.V.M.A. Divisional Report

SOUTHERN COUNTIES VETERINARY SOCIETY*

SUMMER AND SPECIAL MEETINGS

The Summer Meeting of this Division was held at the Museum of the Bournemouth Natural Science Society, Bournemouth, on Wednesday, May 22nd, when the members had the pleasure of listening to and discussing an interesting paper by Dr. Lovell on "The Agglutination Reaction."

The President, Mr. J. F. D. Tutt, was in the chair, and the others present were Messrs. H. S. Caldwell, B. Gorton, R. E. Klyne, E. S. Martin, G. Parr, A. E. Roberts, J. T. Turney, J. Stewart Wood and J. B. White, together with Dr. Wm. Scott, Messrs. G. K. L. Knight and G. K. Fenn-Smith as visitors.

The minutes of the Annual Meeting at Salisbury, as published in *The Veterinary Record*, and also those of a Special Meeting held at Winchester, were taken as read and confirmed.

Correspondence.—The Hon. Secretary announced the receipt of: (1) Letters of apology for absence from Miss Cust, Sir Frederick Hobday, Messrs. R. E. C. Bullen, N. S. Barron, H. C. Rockett and C. Tyler.

(2) A letter from the Central Veterinary Society which extended an invitation to the members to join the members of the Central in a trip to Southampton Docks in July.

This visit had been suggested by Mr. G. N. Gould, one of their own members. The Hon. Secretary asked for the names of any members who wished to take part in the trip.

Clinical Case.—Dr. Scott produced an interesting specimen of fracture of the lumbar vertebræ in a 14-year-old cart-horse. This horse was working with a loaded dung-cart, when he slipped, rose with difficulty and then walked for 400 yards. He then fell again and was unable to rise.

Reflexes were absent in the legs, but were faintly present in the tail, which was remarkable when one saw how complete was the fracture of the vertebræ. Dr. Scott asked if other members had noticed a case of that sort, where the reflexes remained in the tail and not in the legs.

Place of Next Meeting.—It was decided to hold the next meeting at Southampton in September at the South-Western Hotel.

Paper.—The President then invited Dr. Lovell to present his paper, following which Dr. Scott opened the discussion. Both paper and discussion (for which readers are referred to the

* Received for publication June 13th, 1935.

commencement of this issue of *The Veterinary Record*) were received with enthusiasm.

The President proposed a hearty vote of thanks to Dr. Lovell for his interesting paper, and also to Dr. Scott for opening the discussion.

Dr. Lovell, in acknowledgment, made an appeal to members to send him up any dead calves they might have to help him in the investigation he was now making of calf diseases. The calves, he said, must be under three months of age and it was essential that the bacteriological examination should be made as soon as possible, but if they would despatch the carcases by passenger train to the care of the Stationmaster at Waterloo and let Dr. Lovell have a wire, he would see they were collected at the earliest possible moment. Forms giving the necessary particulars would be supplied to those willing to help.

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SPECIAL MEETING

A Special Meeting of the Southern Counties Veterinary Society was held at the Castle, Winchester, on Thursday evening, May 9th, to consider a suggested scale of fees for the examination of cows under the Accredited Milk Scheme. The President, Mr. J. F. D. Tutt, presided, and the other members present included Major Martin and Messrs. H. S. Caldwell, G. N. Gould, W. F. Maynard, A. E. Roberts, J. H. Ripley and J. B. White (Hon. Secretary), together with Messrs. P. Connolly, W. E. Petty, G. W. Searles, G. S. Walker and M. E. White as visitors. Mr. F. A. Barber, the Clerk to the County Council, also attended to explain the proposals so far as they would affect veterinary surgeons in Hampshire. Apologies for absence were announced from Sir Frederick Hobday and Messrs. N. S. Barron, R. E. C. Bullen, R. W. Down, J. McKerlie, C. Pack, C. Roberts, H. C. Rockett and J. Stewart-Wood.

The President opened the meeting by extending a welcome to Mr. Barber and explaining that the meeting had been called to discuss the suggested scale of fees and particularly the scale which was being put forward by the Hants. County Council.

Mr. Barber thanked the President for his invitation to attend the meeting and proceeded to outline the way in which the Hampshire County Council had drawn up their proposed scale. The County Council, he said, thought the charges should be what a veterinary surgeon would ask from his own client. At the same time, they wished to give farmers a choice of two veterinary surgeons within, say, a ten-mile radius, without any extra cost, and this was the reason why they were making no mileage allowance. If the veterinary surgeons felt there should be some charge made, equivalent to a mileage allowance, he suggested it should be 5s. for the first cow and 1s. for each of the others cows that had to be examined for the first 20 cows.

Numerous questions were addressed to Mr. Barber by those present and before Mr. Barber retired the President thanked him on behalf of the meeting for his attendance and also for so kindly putting the room at their disposal for the meeting.

Further discussion followed Mr. Barber's retirement from the meeting and it was eventually decided, on the proposition of Mr. J. H. Ripley, seconded by Mr. W. Maynard, to accept the suggested scale of fees as put forward by Mr. Barber, and which was as follows:—

For the examination of the first cow, 5s.

For the examination of the next 19 cows, 1s. per cow.

For the examination of each cow over 20, 3d. per cow.

For any visit of examination a minimum fee of 12s. 6d.

No mileage for any visit to a farm not more than ten miles distant, but 1s. per mile one way for any distance beyond that.

The meeting concluded with a vote of thanks to the President for calling the members together and the trouble he had taken to get those veterinary surgeons in Hampshire who were not members to join them.

J. P. White, *Hon. Secretary.*

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The undermentioned have been published recently. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office, at the following addresses: London: Adastral House, Kingsway, W.C.2, and 28, Abingdon Street, S.W.1; Cardiff: 1, St. Andrew's Crescent; Manchester: York Street; Edinburgh: 120, George Street.

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Membership Examinations, July, 1935

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Ware, J. McW.
Williams, Miss D. L.
Williams, Miss P. L.
Wilson, R. A. S.

Liverpool

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Ormerod, A. N.
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Williams, H. H. O.

Second Examination

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Kerruish, B. M.
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Tutton, E. A.
Williams, R. E. (A)
Wood, R. B.

(P) Denotes credit in Physiology, etc.
(H) Denotes credit in Histology, etc.
(A) Denotes credit in Animal Management I.

Third Examination

Creasey, R. F. (A) (H)
Jones, S. (A) (H)
Kieran, H.
Richmond, P. (H)
*Shirley, G. N.

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(H) Denotes credit in Hygiene, etc.
* Denotes Second Class Honours.

FOUR YEARS' COURSE

Class C

Blackie, H. P.
Datnow, Miss R.
Howse, A. C.
O'Neill, P. A. F.
Perry, V. E.
Preston-Ball, J. C.
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(H) Denotes credit in Hygiene.

Liverpool—cont.

Class D

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Hollander, Miss E. I.	Waddington, F. G. (M)
Kelly, Mrs. K. G. R.	Yates, Miss M. E.
Setterfield, R. R.	

(M) Denotes credit in Medicine.

(To be continued.)

In Parliament

The following questions and answers have been recorded in the House of Commons recently:—

Irish Cattle (Warble-Fly)

Captain P. Macdonald asked the Minister of Agriculture whether any action has been taken by the Governments of the Irish Free State and Northern Ireland to insist upon the compulsory treatment of cattle against the warble-fly pest; and whether, in view of the importance of ridding this country of this pest, he will consider the desirability of making representations to these Governments to the effect that action should be taken in this matter at an early date?

Mr. Elliot: I understand that a few years ago a campaign of propaganda by experiment and demonstration was begun in the Irish Free State and in Northern Ireland by the respective agricultural departments, but there are no compulsory measures in force there. I am considering the suggestion made in the second part of my hon. and gallant Friend's question.

Sir Basil Peto: Will my right hon. Friend consider proposing at the port of entry the prohibition of entry, during the months February to June, of all cattle which bear the characteristic lump or have fly-maggots upon them?

Mr. Elliot: I could not answer that question without further consideration.

Sir Basil Peto asked the Minister of Agriculture whether he will consider making an order prohibiting the entry at British ports of cattle from Ireland, during the months of February to June, which carry the characteristic lumps of the warble fly maggot, in conjunction with regulations for compulsory dressing of all cattle during these months for warble fly in this country?

Mr. Elliot: I am not at present in a position to add to the replies I have given recently to questions on this subject. As my hon. Friend is aware, the whole question of the control of the warble fly is now being carefully considered.

Sir B. Peto: May I take it that the right hon. Gentleman will consider the possible effect of negotiations on the lines indicated in my question in view of his determination to get the warble fly disease cleared out of this country?

Mr. Elliot: Yes, certainly.

. . . . .

Bullocks (Marking)

Mr. Leckie asked the Minister of Agriculture whether he is aware of the unnecessary suffering caused to bullocks by his Department's methods of marking animals passed for sale to butchers; that the process involves the making of a wound which bleeds and causes distress to the animals, especially in hot weather; and whether he will take steps to see that a method of marking is substituted which will not involve either pain or inconvenience to the animals?

Mr. Elliot: Before a decision was reached in the summer of 1934 to adopt ear-punching as the method of marking cattle in connection with the cattle subsidy, careful consideration was given to various alternative methods. The mark must be permanent, and readily applied, and it was found that ear punching was the only method which satisfied these conditions. This method of marking animals has been in operation in this country and in other parts of the world for a long period. If the punch is made near the tip of the ear, between the principal veins, in accordance with the directions issued by the Cattle Committee, there is, I think, practically no bleeding. As at present advised, I can see no alternative method.

. . . . .

Milk (Germicide Process)

Mr. Rickards asked the Minister of Health whether the new process of adding germicide to milk for destroying bacteria has been brought to his notice; whether he will have the process tested and investigated; and consider whether any modification of the Food and Drugs Adulteration Act would be required to permit of milk so treated being sold on a commercial scale?

Sir K. Wood: I have recently been informed of a claim to the discovery of a new germicide for milk, but I have no knowledge of its composition and no sample has been supplied to my Department. The addition of any germicide to milk would be contrary to the provisions of the Preservatives Regulations and the Food and Drugs (Adulteration) Act, and for the reasons set out in the report of the Departmental Committee on Preservatives in Food I could not contemplate any amendment of the law in this respect.

Brigadier-General Clifton Brown: In view of the report of the Milk Reorganisation Commission, that the Food and Drugs Act should be amended in various particulars, will not my right hon. Friend include this matter with other recommendations when this Act is reviewed?

. . . . .

Foot-and-Mouth Disease

Lieut.-Colonel Todd asked the Minister of Agriculture whether, in the view of his Department, the importation of chilled or frozen meat from the Argentine is a possible source of infection of foot-and-mouth disease in England?

Sir G. Bowyer: My right hon. Friend is advised that whilst there is no evidence that the virus of foot-and-mouth disease could remain alive in the flesh of chilled or frozen meat during the transit of such meat from South America to this country, it would be possible for the virus to survive in the bone marrow of such meat.

Lieut.-Colonel Todd: In view of the terrible loss from the slaughter policy, would it not be fair to place an embargo on Argentine meat?

Lieut.-Colonel Todd asked the Minister of Agriculture whether the Government have considered the position of farmers and landowners affected directly, and indirectly, by foot-and-mouth disease outbreaks, who continued to receive tithe rentcharge demands, and who have no protection against distress being levied upon their implements of husbandry, tools of trade, and stock for failure to meet these demands; and whether he proposes to take any steps in the matter?

Sir G. Bowyer: As regards the first part of the question, compensation payable to farmers in respect of an outbreak of foot-and-mouth disease is related solely to the market value at the time of slaughter of any animals which may

be slaughtered by direction of the Ministry on account of their being affected with foot-and-mouth disease or of their being exposed in any manner to infection. Such compensation is not directly related to any liabilities. The answer to the last part of the question is in the negative.

Lieut.-Colonel Todd: Does the Minister realise that the consequential losses are far greater than the direct losses due to slaughter?

Sir G. Bowyer: Yes, but I am sure the hon. and gallant Member will realise that the Ministry of Agriculture has no jurisdiction over tithe rentcharge.

. . . . .

Patent Medicines (Advertising)

Mr. Todd (for Mr. Hall-Caine) asked the Minister of Health, whether, arising out of the recent deputation received by him on the subject, he proposes to introduce legislation controlling the advertising in this country of patent medicines?

Mr. Shakespeare: My right hon. Friend is not at present in a position to make any statement on this subject.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

July 22nd.—Meeting of the Editorial Committee, N.V.M.A., at 2, Verulam Buildings, Gray's Inn, W.C.1, at 4 p.m.

July 29th—August 2nd: N.V.M.A. Congress at Belfast.

Aug. 1st.—Annual Meeting and Dinner of the Royal (Dick) Veterinary College Alumnus Association, at Belfast, 6.30 p.m.

August 24th.—Last date for entries for Jubilee Memorial Prize Examination.

Sept. 24th to 25th.—Jubilee Memorial Prize Examination.

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BELFAST CONGRESS: TRAVEL VOUCHERS

Vouchers enabling members to travel by rail to the Belfast Congress at reduced rates are now available for members in Ireland as well as those in Great Britain, and can be had on application to the General Secretary, N.V.M.A. 2, Verulam Buildings, Gray's Inn, London, W.C.1.

* * * * *

WHOLE-TIME APPOINTMENTS: POSITION IN THE COUNTIES

Since the publication of the reports of the Reorganisation Commission for Milk (1933) and the Cattle Diseases Committee of the Economic Advisory Council (1934), both of which stressed the necessity for a more intensive campaign against disease in milch cows, particularly tuberculosis, county councils in increasing numbers are appointing whole-time veterinary officers. During the past few months the Bedfordshire County Council have decided to make such an appointment at a salary of £600 rising to £700 per annum, with £200 a year for travelling and subsistence expenses; the Bucks County Council have agreed to make a similar appointment on the staff of the County Medical Officer at a salary of £600 rising to £700 a year; in Dorset two officers have been appointed at salaries of £500 rising to £600 with further increases up to £650 at the discretion of the Council; the East and West Suffolk County Councils have made a joint appointment at £500 rising to £600 a year, with an assistant inspector at £400 rising to £500, and in Montgomeryshire a county veterinary officer has been appointed at £500 rising to £600 a year.

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R.C.V.S. OBITUARY

Prime, Ronald Thomas Covell, 21, Westow Hill, Upper Norwood, S.E.19. Graduated London. December 20th, 1927; died June 7th, 1935.

* * * * *

COUNCIL OF AGRICULTURE AND THE CATTLE DISEASES REPORT

At a recently-held meeting of the Council of Agriculture for England a Report of the Standing Committee on the subject of the Cattle Diseases Report of the Economic Advisory Council was adopted, after considerable discussion. The Report of the Standing Committee, after outlining the proposals contained in the Report under consideration, continues:—

"Since the date of the Report, the Milk Marketing Board has put forward its Accredited Producers Scheme, as from May 1st, 1935, and the Ministry of Agriculture has issued its Attested Herds Scheme, which came into force on February 1st, 1935. The Standing Committee agrees in thinking that, after a period of a few years of the Milk Marketing Board's Scheme, the general standard of cleanliness in the production of milk should have been sufficiently raised that no milk below it should thereafter be permitted to be sold for liquid consumption. It will be observed that the Cattle Diseases Committee were in favour, after a period of notice, of requiring all milk produced for liquid consumption to be of a standard not below that of Grade A. The Standing Committee is, however, doubtful as to the success of the Ministry's scheme for attested herds. It feels that progress under it, as it stands at present, will be so slow that the effect on the total cattle in the country will for a long time be little short of negligible. The Committee is, however, content to wait a year or two and watch results, though it would hope that every step possible will be taken by the Ministry to increase the pace. This could probably best be done by giving more assistance to the farmer in aiding his early efforts to eradicate the disease. Increased co-operation between the veterinary staffs of the Ministry of Agriculture and Fisheries and of the local authorities would be of great value in this connection.

"In the case of the Accredited Producers Scheme, there is one anomaly which the Committee considers must be got rid of, and that

is the requirement that herds producing Grade A milk may have no cows in them which have reacted to the tuberculin test, even if these are segregated from the owners' other cattle. A dairy farmer producing Grade A milk who is anxious to place his herd on the Grade A (t.t.) list, may frequently find himself with animals which react to tuberculin which another dairy farmer, also producing Grade A milk, has not, because his herd is not subject to tuberculin testing. It is hoped the Ministry of Health will be quick to make the necessary adjustment in this regulation, which acts at present as a deterrent to Grade A herds being raised to the Grade A (t.t.) level.

"As regards the recommendation of the Cattle Diseases Committee that routine veterinary inspection should be made obligatory on all local authorities, the Committee considers that this cannot be too strongly urged. Several forward counties are already meeting their responsibilities in this direction, but the others, owing to financial difficulties, are likely to be slow in providing the necessary staff. It appears to the Committee that the best way of dealing with this question is for the co-ordinating Veterinary Staff of the Ministry to be strengthened and set to work as speedily as possible to do their utmost to get local authorities into line on this important matter. They will be able to report progress from time to time, and if the financial difficulties of the counties should prove obdurate they can be better met and overcome if they are clearly and publicly stated.

"As regards the Cattle Diseases Committee's recommendations on the grading of milk and pasteurisation, the Standing Committee sees much force in their suggested simplification of grades, namely, Certified, Pasteurised, Sterilised and Milk (Uncertified). "Certified" milk, under this new grading, would be different from the present "Certified." It would be simply milk which had not undergone any process of heat treatment, was derived from tubercle-free herds, and was of the prescribed standard of cleanliness. It would not be required to be bottled on the farm, but could be sold in sealed containers. The Standing Committee, however, is not in favour of the retention of this term if a better one can be found. "Pasteurised" would be milk which had undergone once only an approved process of heat treatment in a licensed plant. "Sterilised" would be milk which had been raised to boiling point, or higher, in a plant licensed for the purpose and which had undergone no other process of heat treatment; and "Milk (Uncertified)" would be milk of the prescribed hygienic standard which had undergone no heat treatment and was not necessarily derived from tubercle-free herds. The Standing Committee suggests most strongly to the Council that these grades would be more suitable to present conditions than are the old grades, and that it is desirable that all necessary steps be taken forthwith to operate them. Official regulations also require to be made governing the manner of heat treatment.

"The Standing Committee appreciates also the importance of the recommendation that there should be a clause in the agreements between producers and distributors, safeguarding the former from penalties owing to any enforced decrease in their supplies of milk which may be caused by the elimination from their herds of cows reacting to the tuberculin test.

"Another recommendation deserving special consideration is that no local authority should be able to enforce pasteurisation within its area until those supplying the milk had had fair warning, and had been given a reasonable chance to form tubercle-free herds. The question whether the suggested five years is sufficiently long is, in the Standing Committee view, a debatable one which may be solved by experience in the next year or two. If this recommendation of the Committee is acted on, the matter will become of very great importance to producer-retailers, whose very existence as such will depend upon whether they have freed their herds from tubercle or can combine together to erect thoroughly equipped and efficient pasteurising plant; they cannot be expected each to instal such a plant.

"The Standing Committee concurs in, and desires to emphasise, the importance of the recommendation that research should be undertaken on the advice of the appropriate Research Council. It would, of course, be desirable and proper that the Departments responsible for agricultural research should also be consulted. Research institutes now exist for almost every branch of agriculture. The Agricultural Departments, the Agricultural Research Council, the Medical Research Council, or the Department of Scientific and Industrial Research, will know best how to plan the research into any problem which any Marketing Board desires to be solved, where the work could best be done, and the man to whom it seems most desirable to entrust it. A main function of these bodies is to direct and co-ordinate all this class of work, and it would obviously be undesirable for Marketing Boards to initiate and finance research work independently, except perhaps in very rare and exceptional circumstances. Such action would be sure to lead to waste, overlapping, and confusion. It is also undesirable that Directors of Institutes, at which research is carried on, should get to look upon the Marketing Boards as reservoirs from which they can obtain funds without any control from the bodies whose function it is to overlook their work, and to deal with questions of their financial support.

"As regards the recommendation as to standards of tuberculin, one of the difficulties in arriving at uniform results in tuberculin testing is that the material varies in purity and potency. There is no restriction on the importation into this country of tuberculin, nor indeed of any veterinary biological product. The Standing Committee agrees that it is most necessary for legislation to be formulated to rectify this very undesirable state of things.

"The Standing Committee also supports the recommendation in paragraph 13 (*c*), which recommends rights as to entry on dealers' and knackers' premises, etc. These powers are required in order to trace the origin of diseases, to control their spread, and to see that diseased carcases are disposed of in a proper manner.

"In conclusion, the Standing Committee urges on the Council the general view that, since the Report brings to light so many problems of importance both to producers of meat and milk and to the consumers of these important foodstuffs, its recommendations, especially those which have been dealt with in this Report, should receive the earliest possible treatment at the hands of the Government. It is, no doubt, because the problems are involved and the steps necessary to solve them difficult and complex that they should have met delay. The Committee thinks that no further time should be lost, and that the necessary legislation, with correlative changes in central and local organisation, should at once be taken in hand."

"A ZOOLOGICAL INQUEST"

Under the above heading *The British Medical Journal* gives in a recent issue, an extended notice of the report on the deaths of animals in the Gardens in 1934, presented at a recent meeting of the Zoological Society of London. From this we learn that the average number of mammals during that year was 742, and the deaths numbered 222 or 29·5 per cent. The number of birds was 1,532, and of deaths 613, or 40·7 per cent. About one-third of the mammals that died in 1934 had been less than six months in the Gardens, whereas the mortality among acclimatised animals was under one-fifth of the total. With regard to reptiles and amphibia, the average strength was 3,821, and the death record in 1934, 878, or 23 per cent. The year 1934, despite its fine summer and mild winter, was not a very healthy one for animals.

An outbreak of infectious enteritis or cat distemper occurred in three felines in adjoining cages in the small-cat house. All three animals were mature and acclimatised; two survived, and the other succumbed. The cause of death in 159 cases, or 14·8 per cent. of the total deaths of all animals investigated, was diseases of the respiratory system; in 166, or 15·7 per cent., diseases of the digestive system; and in 175, or 16·6 per cent., injuries and accidents. Among respiratory conditions the most important single cause was bronchitis and bronchopneumonia, which accounted for the deaths of 23 mammals and 14 birds. In speaking of fatalities due to digestive conditions, Colonel Hamerton mentioned the case of a gibbon with an acute, inflamed, and partly gangrenous appendix, in which were found impacted two jagged pieces of flint.

Tuberculosis among Menagerie Animals

Colonel Hamerton went on to say that tuberculosis during the year under review had remained at a very low level. It had caused the deaths of only seven mammals, 13 birds, and five reptiles. The distribution of tuberculosis among the animals during the last seven years showed the highest incidence in the Bovidæ (oxen, antelope) and the next highest in the Cervidæ (deer). There had been no case among the anthropoid apes since 1930. Tapirs were peculiarly subject, all the tapirs which died dying of this disease. The tuberculosis rate was also high in the bears. Two llamas died of tuberculosis in 1931. In the horse family tuberculosis was rare. Donkeys and mules were highly resistant, and did not seem to acquire the disease naturally. He could find no case of tuberculosis in a horse, ass, or zebra in the society's menagerie during seven years. The camel, although as a domestic animal it must have many opportunities of acquiring the infection, never seemed to suffer from tuberculosis. Tuberculosis was widely spread in the carnivora, except the sea lion, seal, and walrus. Among birds in freedom the disease appeared very rarely. Sherrington reported a case many years ago of tuberculosis found in a lapwing, a bird rarely kept in captivity, and another case was reported by Dr. Tom Hare in a blackbird caught by a cat in a London garden, but this might have escaped from captivity. Colonel Hamerton had examined a number of so-called wild pheasants picked up dead on shooting estates and found to be tuberculous, but in every case these were hand-reared birds, and had probably acquired the infection from their foster-mothers —domestic hens. The importance of quarantine for new arrivals at the Gardens was shown by the instance of two capuchin monkeys presented to the society in 1933. One of them was in bad health and died in quarantine in April, 1934. The other two appeared quite healthy, but as they had been in contact with the first their quarantine period was prolonged, and one of them died from tuberculosis in June, 1934, and the last of the trio from a generalised infection in November, eight months after it was last in contact with the first animal. Tests were now being carried out on new tuberculin, in the hope that by detecting reactors it might be possible to eliminate tuberculosis completely from the primates, and so save space in the quarantine station. So far as he was aware, tuberculosis never healed in monkeys or assumed the regressive form seen in carnivora and ungulata. The cases of avian tuberculosis during 1934 related to four pheasants, two rails, two turacos, two parrots, a hornbill, a cormorant, a humming-bird, and a duck. He knew of no bird which was not liable to infection of the avian type when kept in captivity. In the London Zoo tuberculosis had been found in all sorts of birds, from the ostrich to the humming-bird. One of the birds least susceptible was the flamingo, the only case of a tuberculous flamingo being recorded in 1928.

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SERUM TREATMENT OF STREPTOCOCCAL INFECTIONS

In view of veterinary experience of failure to prove antistreptococcal serum to be of value in the treatment of streptococcal diseases—joint-ill in foals, mastitis in cattle and strangles—considerable significance attaches to the editorial observations on the above subject made by the *British Medical Journal* in a recent issue. After stating that ten years' experience of the use of streptococcus antitoxin in the treatment of streptococcal infections has merely proved the difficulty of obtaining evidence of the value of this treatment, the comment is made that streptococcal infections being of unending diversity in their severity, extent, and duration, controls must be hard to find, since in quarters where this treatment is believed in it is naturally employed in every instance. In these circumstances only a favourable comparison between present-day results and those antedating the introduction of this treatment can justify it. In this connection the pointed question is asked "Is streptococcus antitoxin still being administered simply because no other generally recognised form of specific treatment exists?"

There is next dealt with the common argument that whether or no serum is going to do good, at least it will do no harm, but "the results now reported by Dr. Leonard Colebrook in the *Lancet* of May 11th appear to mean that in puerperal fever serum treatment so far from doing good is decidedly prejudicial to recovery." The figures (given) "might be taken to mean that serum treatment doubles the mortality from puerperal fever. Making all due allowance for possible fallacies, they must still suggest that the effect of serum treatment may be unfavourable. This is not the first report of unfavourable results from serum treatment in puerperal fever."

The *British Medical Journal* goes on to say that it is not to be expected that Colebrook's conclusion that the use of serum in the treatment of puerperal and surgical sepsis should be discontinued would be quietly accepted, but at least

it should provoke a more critical attitude to this form of treatment and perhaps lead others not only to examine their own results but to alternate serum with some other form of treatment. "The recent claim of Cadham (*Amer. Journ. Med. Sci.*, 1934, clxxxviii, 542) to have reduced the mortality of streptococcal and staphylococcal septicæmia to only 10·5 per cent. by giving fresh normal human serum to supply a deficiency of complement, and small doses of serum from immunised rabbits, is both startling and reasonable enough to justify a trial of his method. What appears above all to be necessary to further progress is that dissatisfaction and enterprise should replace the stereotyped methods and complacency which have so strangely followed the introduction of streptococcus antitoxin into therapeutics. This remedy, whatever may be thought of any individual report on it, is quite certainly a comparative failure in most of the directions in which it has been employed, and something better must be found."

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BRIDGEND BUTCHER IN TROUBLE

Under Articles 2 and 11 of the Tuberculosis Order of 1925, on June 20th, 1935, at Bridgend, Glamorgan, Charles Phipps, a butcher of the same town was fined £5 on each of four counts in respect of three cows, making £20 in all.

At a later court on the same day he was fined £15 and £4 15s. 6d. costs for cruelty to a cow which had been kept for days with a dislocated hip and was discovered upon *post-mortem* to be suffering from a most advanced stage of tuberculosis.

The Chief County Veterinary Officer was the only witness called by the prosecution in each case.

From *The Veterinarian*

July, 1835

Selling a Horse

A Scene at —— "Gentlemen, what can you hesitate about? Only look at her! She is one of the most beautiful creatures that I have ever had the honour of submitting to your notice! So gentle in her paces—indeed, so safe a goer, that a child might ride her. Her pedigree is excellent—she is thoroughbred from her ear to her hoof; and the Herald's College could not produce a more sound and satisfactory one. She comes from a good house, I pledge my word, gentlemen. My Lord Duke, will you allow me to say £250 for your Grace? She will, notwithstanding the excellence of your Grace's stud, be an ornament to it. She is a picture—complete to a shade; in fact, I could gaze upon her for ever, and always be struck with some new beauty she possesses. Thank you, my Lord Duke; I was certain your Grace would not let such an opportunity pass. There is not a horse-dealer in the kingdom who can show such a fine creature! She is above competition—I may say she is matchless! The Regent's Park might be betted to a mole-hill with safety that she has no paragon. Sir Henry, let me call your attention to Cleopatra! She is like her namesake in the olden times—but beautiful without paint! She is pure Nature, and no vice! Her action, Sir Henry—yes, her action—you shall judge for yourself. Run her down, John. The Graces, I am sure, *Sir Harry*, were they to behold her movements, would be out of temper with her captivating excellence! *Taglioni*, I must admit, can perform wonders with her pretty feet; but *Cleopatra*, my Lord Duke, can *distance* the whole of them put together, and positively leave the Opera House, with all its talent, in the background. £300. Going! Going!—£310. Thank you, my Lord Duke, she must be your's. For the last time going at £310: I will allow you five minutes to compose your minds before you lose sight of this handsome creature. I do impress upon you to remember that the opportunity once lost—£320; Sir Harry, I am obliged to you—the world has always acknowledged you as a man of great taste in matters of this kind; and, without flattery, you have never shown it more than in the present instance. *Going*!—Cleopatra, my Lord Duke, will be in other hands—a good bidding will make her your own for ever.—£340—My Lord Duke, I can only express my gratitude by saying that you have done me honour.—*Going*! *Going*!—in fact, gentlemen, I am like an artist in this case: I do not like to leave such a delightful picture, and I could *dwell* upon the qualities of Cleopatra to the echo that applauds again—but most certainly I have given you all a fair chance: are you all silent? *Going* for £340. What is that sum for one of the greatest English beauties ever submitted to the inspection of the public? £350—thank you, Sir Charles—worth your money at any price. I have witnessed your notice of Cleopatra for some time past—she will bear looking at again and again! I am glad to see she has so many suitors for her hand—I beg pardon, gentlemen—a slip will happen to the best of us—her *feet*, I should have said; but, nevertheless, I am happy to see she has a host of admirers. I cannot *bid* myself, or else I would 'make play,' and Cleopatra should become a noble prize.—£370—Bravo! my Lord Duke! For £370 positively, yes positively, 'pon my honour, positively the last time. You are sure, gentlemen, that you have all done? Don't blame me, blame yourselves! Going, *once*! Going, *twice*! Going, *three times*! [*The auctioneer makes a long pause and numerous flourishes with his hammer.*] Gone!!! Cleopatra belongs to the Duke."—Egan.

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

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GRUNTING IN HORSES

To the Editor of The Veterinary Record

Sir,—As one who took part in the correspondence on grunting, I must refer Mr. Sutton to the concluding part of my letter in the issue of June 1st.

I should never examine a horse for soundness without mentioning any defect. The veterinary surgeon for the purchaser is expected to "hold the baby," and if not careful he may be left with it.

Yours faithfully,

J. P. Railton.

The White House,
Kington.
Herefordshire.
July 15th, 1935.